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U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

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Use of funds for printing this publication approved by the Director of the Bureau of the Budget, June 30, 1961.

U.S. Government Research Reports

This publication is issued twice a month to announce new reports of research and development released by the Department of Defense and certain other agencies of the Federal Government sponsoring research and development programs. Unless otherwise indicated, reports listed are available from the Office of Technical Services. The documents are available in original, reproduced, or microfiche copy only.

The first section of U. S. Government Research Reports (USGRR) is prepared for the Defense Documentation Center and is called "Technical Abstract Bulletin" (TAB). (DDC is a Department of Defense agency which services DOD agencies and their contractors with military research information.) The next section is called "Non-Military and Older Military Research Reports." Here are listed new reports of civilian agencies of the Government and military research reports not to be found in the "TAB." Most of these older military reports have been acquired by OTS in response to specific industry requests.

Atomic Energy Commission reports available from OTS are listed in Nuclear Science Abstracts. NSA is available to the general public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at $30 a year (domestic), $37 a year (foreign). Single copy cost, $1.75 (plus 25 percent for foreign mailing).

National Aeronautics and Space Administration reports available from OTS are listed in Scientific and Technical Aerospace Reports. STAR is available to the general public on subscription from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at $25 a year (domestic), $31 a year (foreign). Single copy, $1.50 (plus 25 cents for foreign mailing).

How To Order Reports

Almost all reports listed in USGRR are available from the Office of Technical Services, U. S. Department of Commerce, Washington, D. C., 20230, or may be ordered through any Department of Commerce Field Office. Prices are given with each entry. Hard copy price is indicated by the letters "HC"; microfiche price is indicated by the letters "MF." Please use the identification numbers (AD number, PB number) and titles of reports when ordering. Also use accession numbers when ordering documents listed in NSA and STAR. Prepayment is required or purchases can be charged to Superintendent of Documents deposit accounts.

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NOTICE TO SUBSCRIBERS ABOUT RECENT OTS CHANGES

Recent developments aimed at strengthening and broadening the OTS program, under Public Law 776 - 81st. Congress, for the collection and distribution of Government research and development reports will result in some important changes directly affecting OTS customers. Changes just made include document prices and method of microphotography. In the future, changes in the price of literature searching and in the composition of the USGRR, and possibly other changes, will be made and announced.

An interagency agreement, announced by the White House on February 28, called upon the Department of Commerce to strengthen and broaden the functions of OTS under Public Law 776 to make the agency more effectively a "Clearinghouse for Federal Scientific and Technical Information."

Steps to develop such a Clearinghouse are being taken as rapidly as possible, and the Office of Technical Services has been extensively reorganized to effectively carry out the expanded functions.

The Clearinghouse provides a single point of contact through which current research efforts and the results of Government-sponsored research in science and technology can be made available to industry, commerce, and the general public. The Clearinghouse collects, organizes, publicizes, and provides reference, referral, and sales services for technical reports and translations received from domestic and foreign sources. The primary aim of the Clearinghouse is to achieve through interagency agreement and cooperation a unified documentation and distribution system for Government-generated technical reports and information on research in progress.

Another significant development, in line with the interagency agreement, was the signing on March 9 of an agreement between the Department of Commerce and the Department of Defense providing for OTS to handle all processing and distribution of unclassified/unlimited DOD reports, a function formerly performed largely by the Defense Documentation Center, except that OTS was responsible for announcement, reproduction, and sale of these documents to the public.

Prices

OTS has always been required by Public Law 776 to operate its reproduction and distribution program on a self-supporting basis. For some time, OTS has had one price for printed documents and another for documents reproduced by "blow-back" from microfilm. In order to establish a single pricing schedule, and one which will return costs of reproduction and handling, the agency has established a new price for all original or reproduced documents which on the average are 1/3 lower than the previous pricing schedule, as shown by the following table.

Price Comparison of New Standard Price with Present Dual Pricing Schedule

Pages	% Sales	Printed	Xerox	Average Present Price	New Standard Price
1 - 25	41.5	$ .50	$ 2.10	$ 1.30	$ 1.00
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151 - 200	5.5	3.00	13.50	8.25	5.00
201 - 300	4.8	3.50	18.50	11.00	6.00
301 - 400	1.2	5.00	21.00	13.00	7.00
401 - plus	2.2	6.00 plus	22.75 plus	14.38 plus	7.00 plus .01/page in excess of 400 pages

MOTICE TO SUBSCRIBERS

Non Standard Binding Schedule

For

Original Reproduced or Microfiche Copies of Documents

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Microphotography

All documents entering the OTS collection as of July 15, 1964 will be available on microfiche (a unitized sheet form of microphotography) as well as full-size reproduction. The International Standards Organization size of 105 mm. x 148 mm. (approximately 4"x6") sheets of microfiche will be used. Image size will be generally an 18:1 reduction. If a document contains 57 pages or less, normally only one sheet of microfiche will be necessary. "Trailer sheets", or sheets in addition to the first for longer reports, will contain somewhat more pages.

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The USGRR, beginning with the August 5 issue, contains listings and abstracts of only that material not listed and abstracted in other journals. There are four specialized journals abstracting documents available from OTS:

U. S. Government Research Reports -- Documents not listed in the other journals.
Technical Translations -- All translations.
Nuclear Science Abstracts -- AEC documents.
Scientific and Technical Aerospace Reports -- NASA documents.

Subscription prices for these publications are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20204.

Improved Customer Service

In connection with the above developments, OTS is consolidating all its documentation operations, including printing and document storage and dissemination, in one building. All services to the customer should be greatly improved, including more prompt servicing of orders for documents.

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TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-602 309 Div. 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IMPACT ACTUATED MECHANISM FOR ENGAGING FIRE EXTINCTION SYSTEMS,
by A. I. Korolev and A. S. Vinogradov.
11 Jun 64, 6p
FTD TT64 180; TT 64 11844

Unclassified report

Unedited rough draft trans of Russian patent 157887, appl. 806537/40-23, 3 Dec 62, p. 1-2.

Descriptors: (*Fire extinguishers, Aircraft equipment), (*Aircraft fires, Fire extinguishers), Patents, Aircraft landings, Impact shock, Fire extinguishers, Design, USSR, Fire safety, Actuators.

AD-602 384 Div. 1, 2
OTS Prices: HC $7.00/MF $2.00

Weather Bureau, Washington, D. C.
CLIMATOLOGICAL SUMMARIES FOR THE SUPERSONIC AIRCRAFT, NEW YORK - SAN FRANCISCO ROUTE.
Jun 63, 446p
Contract FAA/SRDS A178, Proj. 2063R

Unclassified report

Descriptors: (*Supersonic planes, Flight paths), (*Flight paths, Meteorological parameters), All-weather aviation, Supersonic flight, Meteorology, Climatology, Data, Tables.

Detailed climatological information is presented for a selected air route (New York to San Francisco and return) to provide needed information for the design and operation of a supersonic aircraft. This information is shown primarily for altitudes between 50,000 and 100,000 feet.

AD-602 421 Div. 1, 19, 28
OTS Prices: HC $4.00/MF $1.00

Applied Psychology Corp., Arlington, Va.
THE ROLE OF EXTERIOR LIGHTS IN MID-AIR COLLISION PREVENTION.
Final rept. no. 4,
by Theodore H. Projector. Jul 62, 148p
Contract FAA BRD127, Proj. 100 512R

Unclassified report

Descriptors: (*Navigational lights, Aviation safety), (*Aviation safety, Navigational lights), Aviation accidents, Visual thresholds, Lighting systems, Signals, Colors, Coding, Standardization, Visibility, Visual perception, Intensity, Optical equipment, Aircraft equipment.

This report summarizes that portion of a research program on visual collision-avoidance techniques which deals with the design and use of navigation light systems. The findings are examined from the viewpoint of the Civil Air Regulations, and a three-phase program for improvement is outlined. In Phase I, it is indicated that genuine standardization is urgently needed and can be achieved with minimum delay with a standard consisting of red, green, and white steady-burning position lights and a red, flashing anti-collision light. In Phase II, an intermediate-range program, the one major defect of the system suggested for Phase I (the absence of left-right indication to the rear) is to be corrected by substitution of a two-color light, yellow and bluish white, for the white taillight. In Phase III, a long-range program, it is suggested that investigation into the possibility of altitude coding in light systems be continued. In all three phases, additional detailed recommendations are made to insure maximum utilization of navigation lights. (Author)

AD-602 422 Div. 1, 19, 28
OTS Prices: HC $2.00/MF $0.50

Applied Psychology Corp., Arlington, Va.
DISTANCE ESTIMATION OF FREQUENCY-CODED AND UNIFORMLY FLASHING LIGHTS.
Technical rept. no. 12.
Jun 62, 32p
Contract FAA BRD127, Proj. 110 512R
PB 165 333, N63 18268

Unclassified report

Descriptors: (*Visualperception, Aviation safety), (*Navigational lights, Visual perception), Visual signals, Thresholds (Physiology), Aviation accidents, Pilots, Lighting equipment, Aircraft equipment, Intensity, Experimental data, Aviation accidents, Tests.

The accuracy with which pilots can judge the distance to a uniformly flashing light and to a light providing flash rate cues of distance was measured in a laboratory setting, for the purpose of determining whether distance cues improved accuracy. For each kind of light, subjects made practice judgments in which they were told their accuracy, then completed a series of test problems without accuracy information. Results indicate that judgments made without flash rate cues are as accurate as when these cues are provided. Nearer lights tend to be judged as being farther away then they actually are, and far lights are judged as being nearer than actual. At least within the short distances studied, extra cues to actual distances of a light of the type provided in this experiment do not improve accuracy of distance judgments when the observers have had practice. (Author)

AD-602 423 Div. 1, 28
OTS Prices: HC $2.00/MF $0.50

Applied Psychology Corp., Arlington, Va.
FLIGHT SIMULATOR TESTS OF ALTITUDE-CODED LIGHTS.
Technical rept. no. 8.
Mar 62, 40p
Contract FAA BRD127, Proj. 110 512R
N63 17952

Unclassified report

Descriptors: (*Aviation safety, Visual signals), (*Visual signals, Aviation safety), (*Marker lights, Aviation safety), Flight simulators, Pilots, Flight paths, Visual acuity, Aviation accidents, Coding, Night flight,

FEDERAL REGIONAL TECHNICAL REPORT CENTERS

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Government Documents Center
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Some PB reports listed as available from OTS may be examined at the following libraries:

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Cincinnati, Ohio 45200

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Detroit, Michigan 48200

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Salt Lake City, Utah 84100

The following Cumulative Indexes for U. S. Government Research Reports are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 32	July - December 1959	$1.00
Volume 33	January - June 1960	$1.00
Volume 34	July - December 1960	$1.00
Volume 35	January - June 1961	$1.00
Volume 36	July - December 1961	$3.50
Volume 37	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 37	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
Volume 37	Annual Cumulative Index January - December 1962 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
Volume 38	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50

For information regarding the availability of earlier indexes write to Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

achievement of acceptable low speed characteristics represents a major problem whether accomplished with fixed structural geometry, or by variable sweep. Propulsion cycle studies must be continued in order to obtain the optimum compromise of adequate thrust for takeoff, transsonic acceleration and cruise, compatible with acceptable specific fuel consumption and takeoff noise.

AD-602 563 Div. 1, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOME ACCURATE SOLUTIONS OF THE PROBLEM OF NATURAL VIBRATIONS OF A SWEPT-BACK WING IN A SUPERSONIC FLOW OF GAS,
by V. M. Lyubimov. 27 Dec 63, 14p
FTD MT63 144; TT 64 11931

Unclassified report

Edited machine trans. of A kademiya N auk SSSR. Institut Mekhaniki. Inzhenernyi Sbornik, 1961, v. 31, p. 171-178.

Descriptors: (*Swept-back wings, Supersonic characteristics), (*Supersonic flow, Swept-back wings), Vibrations, Flutter, Gas flow, Boundary valve problems, USSR.

The investigation conducted on the problem of natural vibrations in a swept-back wing with constant chord with a coincidence of the flexural axis and the axis of the centers of mass of the wing permits the following qualitative conclusions. During purely torsional and combined flexural and torsional disturbed motions of the wing, flutter and divergence are impossible with identical frequency. During purely flexural motions it is possible for flutter and divergence to occur. (Author)

AD-602 565 Div. 1, 27
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CERTAIN PROBLEMS OF THE JET DRIVE OF A HELICOPTER ROTOR BY MEANS OF A TURBOJET ENGINE ATTACHED TO THE BLADES,
by B. P. Kaganovich. 30 Mar 64, 30p
FTD MT63 264; TT 64 11933

Unclassified report

Edited machine trans. of mono. Solivye Ustanovki Vertoletov (Helicopter Power Plants) Moscow, 1959, p. 167-185.

Descriptors: (*Helicopters, Jet propulsion), (*Rotor blades, (Rotary wings), Turbojet engines), Helicopter rotors, Gas turbines, Air cooled, Aerodynamic configuration, Torque, Loading (Mechanics), USSR.

The creation of a turbojet engine suitable for work on rotor blades requires the effectuation of various experimental and design investigations. The following are the main problems: Ensuring efficiency of bearings and heat dissipation from oil under the conditions of large radial loads; and balancing the gyroscopic moment created by the engine rotor revolving together with the rotor blade. (Author)

AD-602 598 Div. 1
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LATERAL VIBRATIONS OF AN AIRCRAFT, CAUSED BY EFFECT OF WIND GUSTS,
by A. S. Dubov. 27 Dec 63, 26p
FTD MT63 118, TT 64 11969

Unclassified report

Edited machine trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR) 1959, no. 98 [160] p. 3-16.

Descriptors: (*Aircraft, Vibration), (*Gust loads, Aircraft), Gusts, Aerodynamic loading, Boundary layer, Differential equations, Functions, Moments, Center of gravity, Acceleration, USSR.

In the article equations are developed establishing the connection between lateral vibrations of aircraft and horizontal gusts. Equations are written in a general form taking into account possible differences of components of wind on different sections of the boundary layer of the aircraft. The solution is introduced for the particular case, when wind can be assigned one value, by averaging all along the boundary layer of the aircraft. An analysis of the effect of gusts of different intensities on the side acceleration of the aircraft's center of gravity is conducted. The possibility is explained of solving the inverse problem -- finding characteristics of horizontal gustiness of the wind by side accelerations of aircraft. Numerical calculations were made for a 'Northrop 2E' aircraft. (Author)

AD-602 604 Div. 1, 18
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MODERN MILITARY TRANSPORT PLANES.
5 Nov 63, 5p
FTD TT63 790; TT 64 11975

Unclassified report

Unedited rough draft trans. of Repules (Hungary) 1963, no. 6, p. 16.

Descriptors: (*Jet transport planes, Design), Military requirements, Turbojet engines, USSR.

AD-602 674 Div. 1
OTS Prices: HC $3.00/MF $0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
RECOMMENDATIONS FOR EQUIPMENT CONFIGURATION STANDARDS FOR TOWER CABS.
Final rept.
by J. Roy Bradley and Richard K. Ohman. Apr 64, 53p
Proj. 101 910X, pt. A
FAA RD64 64

Unclassified report

Descriptors: (*Air traffic control systems, Configuration), (*Towers, Design), Control simulators, Control panels, Models (Simulations), Standards, Human engineering, Display systems.

The report contains the results of a series of air traffic control exercises that were conducted to determine a limited number of equipment arrangements which can be used as agency standards for control towers of four different workload levels. The test facility consisted of a pentagonal tower cab mounted on top of a 110 ft structure located at NAFEC, Atlantic City, New Jersey. Inside the cab, a mock-up was constructed of specially designed consoles and console instrument turrets that could be moved from place to place. The mock-up served as a simulator for

Statistical analysis, Tests, Reaction (Psychology), Applied psychology.

A regularly flashing, fixed-frequency light and a light giving altitude information by means of dot-dash signals were compared in terms of their usefulness to pilots who were trying to judge the relative altitude and vertical flight path of a simulated intruder aircraft. Standardized problems were constructed for a modified F-100/151 flight simulator, and included three rates of altitude change, approaches from left and right, and a number of collisions and misses. Accuracy in determining both relative altitude and vertical flight path of the intruder was better with the altitude-coded light than with the regularly-flashing, fixed-frequency light. With both kinds of lights, pilots became less accurate in judging relative altitude, but more accurate in judging vertical flight path, as the rate of altitude change increased. (Author)

AD-602 427 Div. 1, 9
OTS Prices: HC $4.00/MF $0.75

Melpar, Inc., Falls Church, Va.
SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT. VOLUME II. V/STOL ANALYSIS REPORT. STUDY, EQUATIONS OF MOTION OF VERTICAL/SHORT TAKE-OFF AND LANDING OPERATIONAL FLIGHT/WEAPON SYSTEM TRAINERS,
by Walter McIntyre. Sep 63, 119p
Contract N61339 1205
NATRADEVCEN 1205 2 AD 438 926

Unclassified report

Descriptors: (*Helicopters, Flight simulators), (*Vertical take-off planes, Aerodynamic configurations), Training devices, Simulation, Short take-off planes, Aerodynamic characteristics, Mathematical models, Tensor analysis, Airplane landings, Special purpose computers, Naval training.

The report promotes an understanding of V/STOL analysis for simulation purposes and develops equations of motion compatible to either analogue or real time digital solution. A general set of equations of motion are developed in which axis systems and aerodynamic coefficients are minimized. Equations of motion are then developed for five different V/STOL aircraft wherein the need for additional axis systems and aerodynamic coefficients for a particular V/STOL configuration is developed. (Author)

AD-602 509 Div. 1, 28
OTS Prices: HC $3.00/MF $0.50

Aeronautical Research Labs., Melbourne (Australia).
PROJECTED SYMBOLIC DISPLAYS FOR GENERAL AIRCRAFT,
by J. R. Baxter. Mar 63, 54p
Contract ARDS A156, Proj. 114 15 6R
ARL/HE14 N63 19904

Unclassified report

Reprint of note.

Descriptors: (*Display systems, Transport planes), (*Instrument landings, Display systems), Instrument panels, Flight instruments, Beacons, Approach indicators, Feasibility studies, Australia, Aircraft landings.

The projected symbolic display concept has gained increased support as a means of providing instrument information in a form wholly compatible with visual information from the outside world. Several such displays have been proposed for large transport aircraft and, in this report, the practicability of a simplified version for general aircraft is examined in detail. There are two separate approaches to the simplification of the display-one based on the use of ILS information to locate the runway symbol and the other on the use of ground beacons. Even after gross simplifications of the equipment, either type of simplified projected display appears to have substantial advantages over a standard instrument panel. The type based on ground beacons would seem to provide the better aid for the pilot, but the basic equipment will not be fully developed for some years. An early start on the flight evaluation of a simplified projected display based on ILS has been recommended. (Author)

AD-602 511 Div. 1, 19
OTS Prices: HC $4.00/MF $1.00

Bell Aerosystems Co., Buffalo, N. Y.
F-102A MODIFICATION AND INSTRUMENTATION PROGRAM.
Final engineering rept.
18 Feb 63, 145p Bell 60009 188
Contract FAA BRD252

Unclassified report

Descriptors: (*Jet fighters, Flight control systems), (*Flight control systems, Landing aids), (*Automatic pilots, Landing aids), Flight instruments, Modification kits, Design, Construction, Installation, Compatibility, Radar corner reflectors, Servomechanisms, Instrument panels, Instrument landings, Flight tests.

The purpose of the F-102A Modification and Instrumentation Program was to make the F-102A aircraft compatible with the Landing Control, Central, AN/GSN-5A. Included in the program were: the modification of the automatic flight control system; the design, fabrication and installation of the instrumentation package, corner reflector, automatic throttle and automatic decrab systems. A flight test program was conducted and delivery acceptance of the modified aircraft was made by FAA/BRD upon the completion of ten consecutive 'hands' off automatically-controlled approaches and landings. (Author)

AD-602 549 Div. 1, 33
OTS Prices: HC $4.00/MF $1.00

Federal Aviation Agency, Washington, D. C.
SUPERSONIC TRANSPORTS. A PRELIMINARY STUDY OF AIRWORTHINESS, OPERATIONS, AND MAINTENANCE STANDARDS,
by Harold D. Hoekstra. Mar 61, 142p

Unclassified report

Descriptors: (*Supersonic planes, Transport planes), (*Transport planes, Supersonic flight), Civil aviation, Aviation safety, Air traffic, Shock waves, Performance (Engineering), Flight, Fluid dynamic properties, Aerodynamic loading, Airframes, Aircraft equipment, Aircraft engines, Terminal flight facilities, Air traffic control systems, Maintenance.

New ranges of speed, temperature and environmental conditions require that extensive research and development be done before a reliable and economic civil supersonic transport can be produced. Specific civil supersonic transport airframe and engine designs cannot be established until more factual information is obtained on the sonic boom - the effect of aircraft weight, attenuation with altitude, the effect of maneuvers and meteorological variations, and public acceptance. The usefulness of the supersonic transport will be vitally related to navigational facilities, airports, and traffic control. Delays would not only reduce the block speed but would also substantially reduce the payload by increasing the fuel required. The

from this and other hazards associated with JP-4 that jet passenger aircraft, at least, should use kerosene fuels where possible. (Author)

AD-602 823 Div. 1, 28
OTS Prices: HC $3.00/MF $0.75

Office of Naval Research, Washington, D. C.
VISUAL, DISPLAY, AND CONTROL PROBLEMS RELATED TO FLIGHT AT LOW ALTITUDE.
Symposium rept. 3-5 Mar 64,
ed. by James W. Miller. 1964, 60p
ONR ACR95

Unclassified report

Prepared in cooperation with Autonetics, Anaheim, Calif.

Descriptors: (*Symposia, Flight), (*Flight, Low altitude), Flight instruments, Optical instruments, Display systems, Flight control systems, Performance (Human), Vibration, Vision, Geography.

Contents: Mission and operational analysis; Geographic orientation; Nonelectronic navigational aids; Displays and controls; Television systems; Pilot task loading; Visual detection and recognition; The need of operational flight data; Training and selection; Simulation, stress, and related variables; Vibration and buffeting; Automatic systems to aid the pilot; Geographic orientation during low-altitude flight; Operational problems in low-altitude high-speed missions; Visual aspects of low-level flight; Human performance during vibration.

AD-602 863 Div. 1, 28
OTS Prices: HC $3.00/MF $0.75

Sperry Gyroscope Co., Great Nick, N. Y.
RESEARCH IN PREDICTIVE INSTRUMENTATION FOR MANUAL CONTROL.
Interim rept.
Dec 63, 87p HB-92020027
Contract Nonr4197 00

Unclassified report

Jointly sponsored by Office of Naval Research, Bureau of Naval Weapons, and U. S. Army Materiel Command.

Descriptors: (*Flight instruments, Flight control systems), (*Flight control systems, Instrumentation), Human engineering, Manned, Control systems, Servomechanisms, Display systems, Cockpits, Control simulators, Flight simulators, Analog computers, Test equipment, Test methods, Tests.

The work accomplished to date includes the following: (1) A detail definition of the characteristics of the control systems to be studied; (2) the design and fabrication of a complex of experimental equipment which will permit the research to be implemented; (3) performance criteria particularly suited to evaluating manual control capability for tasks with limited time constraints have been generated; and (4) an experimental program which will permit the systematic inclusion of all of the variables which affect control performance has been established in detail. The completion of this research will provide a sound basis for appropriately applying prediction concepts to specific aircraft maneuver tasks, incorporating prediction information in existing cockpit displays, and generating new displays to handle prediction data. (Author)

AD-602 898 Div. 1, 14
OTS Prices: HC $2.00/MF $0.50

New Departure Div., General Motors Corp., Bristol, Conn.
RESEARCH AND DEVELOPMENT OF AIRFRAME BEARINGS FOR AEROSPACE VEHICLES.
Progress rept. no. 3, 1 Nov 62-31 Jan 63,
by R. J. Matt, J. B. Muratore, R. E. Murteza, and C. J. Zupkus. 11 Feb 63, 48p
Contract AF33 657 8431, Proj. 1315, Task 131501

Unclassified report

Descriptors: (*Airframe bearings, Aerospace craft), High-temperature research, Lubricants, Aluminum compounds, Oxides, Metal coatings, Tin, Germanium compounds, Tantalum compounds, Tungsten compounds, Molybdenum compounds, Gallium, Calcium compounds, Selenium compounds, Boron compounds, Beryllium compounds, Silicides, Fluorides, Nitrides, Sulfides, Antioxidants, Ceramic materials, Tests, Friction, Wear resistance, Vacuum apparatus.

A total of 153 Phase 1 tests were completed at temperatures of -100F, 1500F, 2000F, and 2500F. Results demonstrated significant differences in the coefficient of friction, wear, and load-carrying ability, and some promise of satisfactory bearing materials for the entire temperature range is indicated. It was agreed to discard four of the eight original Phase 1 test materials from further testing. The Phase 2 lubricant study is currently in progress and four of the six lubricants have been selected. Consideration is being given to two additional lubricants. The Phase 3 ultrahigh vacuum test rig components are being fabricated and will be installed into the test chamber very soon. (Author)

testing the efficacy of various equipment configurations. Recommendations are presented in respect to each work-load level. (Author)

AD-602 675 Div. 1, 9
OTS Prices: HC $2.00/MF $0.50

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
TECHNIQUES FOR DETERMINING INFLIGHT THRUST.
Final rept.
by Jack J. Shrager and Gunther Cohn.
Jan 63, 36p F-A2495-8
Contract FAA BRD285, Task 8

Unclassified report

Descriptors: (*Thrust, Measurement), (*Flight instruments, Reviews), Jet engines, Performance (Engineering), Instrumentation, Errors, Theory, Equations, Fluid mechanics.

Methods of measuring the thrust of jet engines were surveyed to determine the state of the art of such measurements and their possible useful application as engine parameters for cockpit presentation. Some other systems for indicating engine performance were also considered but were not studied in detail because of their limitations. An analysis of the theory underlying some of the thrust measuring systems was made to determine if there were any inherent errors. Testing of completely integrated thrust measuring systems was recommended. (Author)

AD-602 689 Div. 1
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONTEMPORARY MEANS FOR EMERGENCY ABANDONMENT OF AIRCRAFT, CHAPS. 1, 9-10,
by S. M. Alekseev, Ya. V. Balkind and others.
2 Jun 64, 208p
FTD TT63 420, TT 64 71121

Unclassified report

Unedited rough draft trans. of mono. Sovremennye Sredstva Avariinogo Pokidaniya Samoleta, Moscow, 1961, p. 5-23, 307-431.

Descriptors: (*Aircraft equipment, Aviation safety), (*Aviation safety, Aircraft equipment), Ejection seats, Acceleration, Deceleration, Rescues, Protective clothing, Pressure suits, Oxygen masks, Breathing apparatus, Sleds, Tests, Flight, High altitude, Test equipment, Aviation personnel, Aviation medicine, USSR.

CONTENTS: General data on contemporary facilities for the rescue of an aircraft crew under emergency conditions; high-altitude and protective equipment; testing of survival and rescue equipment.

AD-602 734 Div. 1, 9
OTS Prices: HC $3.00/MF $0.75

Princeton Univ., N. J.
THE LONGITUDINAL EQUATIONS OF MOTION OF AN AIRBORNE TOWED VEHICLE INCORPORATING AN APPROXIMATION OF CABLE DRAG AND INERTIA EFFECTS.
Final technical rept.,
by E. H. Law. May 64, 76p AER687
Contract N62269 1369, Task RUDC4B000

Unclassified report

Descriptors: (*Towed bodies, Airborne), (*Towing cables, Aerodynamic characteristics), Towed planes, Motion, Moments, Linear systems, Partial differential equations, Weight, Drag, Velocity, Acceleration.

The longitudinal equations of motion of a cable and towed vehicle system are developed. Approximations for the effects of cable drag and inertia are included in the development. The cable is assumed to act as a rigid body hinged at both the towing aircraft and towed vehicle. The system as analyzed thus has two degrees of freedom. However, in order to present the equations in the 'familiar language of aircraft dynamics', five equations in five unknowns are utilized. (Author)

AD-602 760 Div. 1, 2
OTS Prices: HC $4.00/MF $0.50

Kaysam Corp. of America, Paterson, N. J.
DEVELOPMENT OF 100,000-FOOT, DUAL-PURPOSE, FAST-RISE BALLOON.
Final rept. for 1 Jun 62-31 Oct-63,
by Eric Nelson. 31 Oct 63, 115p
Contract AD36 039SC89116, Proj. 3M36 21 003

Unclassified report

Descriptors: (*Meteorological balloons, Construction), Balloons, Manufacturing methods, Materials, Rubber, Synthetic rubber, Aerodynamic configurations, Model tests, Wind tunnels, Flight testing, Performance (Engineering), Aerodynamic characteristics.

Work was conducted in the following areas: Neoprene and natural rubber compounds having suitable physical properties were developed. A simple wind tunnel was made for the evaluation of prototype balloons. A number of composite spherical and streamlined balloons were constructed, ranging from two-piece balloons to four-piece assemblies. Flight testing of these models was conducted in order to determine the best design. Ten engineering models were submitted, and the construction was modified and improved in later submissions. Among these modifications were changes to ensure the survival of the inner balloon in composite balloon assemblies and changes to ensure the falling away of the outer balloon after burst. The effect of mechanical attachments, such as fins and streamers, was evaluated. (Author)

AD-602 765 Div. 1, 2
OTS Prices: HC $1.00/MF $0.50

Air Weather Service, Scott AFB, Ill.
DANGER TO JET AIRCRAFT FROM LIGHTNING,
by Herbert S. Appleman. 1 Jul 64, 9p
AWS TR179

Unclassified report

Descriptors: (*Jet planes, Lightning), (*Lightning, Aviation safety), (*Aviation safety, Lightning), Thunderstorms, Atmospheric electricity, Hazards, Airplanes, Damage, Fuel tanks, Explosions, Fuels, All-weather aviation.

This report presents the latest available information on lightning hazards to jet aircraft. Included are the temperature and altitude range where most strokes are encountered, a brief discussion of the type of damage likely to be incurred, and a somewhat more detailed look into the possibility of fuel-tank explosions due to lightning and electrostatic discharges. It appears that, while the possibility of such explosions is small, aircraft using JP-4 fuel are generally more vulnerable to this hazard than those using gasoline or kerosene. It is concluded

explosion of the Tungus meteorite in 1908 there is expressed a hypothesis on the similarity of mechanisms even for qualitatively different explosions. There is proposed the following mechanism of geomagnetic effect of nuclear explosions. Immediately after explosion over an area with a radius of 3,000 to 4,000 km., there develops a heightened ionization which creates possibilities favorable for the propagation of hydromagnetic impulse. First phase of perturbation is caused by this impulse. Second or main phase is caused by the action of the shock wave. Lowering of the field and its subsequent-restoration are associated with displacement of currents with respect to the observation stations and their gradual damping. (Author)

AD-602 407 Div. 2, 8
OTS Prices: HC $4.00/MF $0.75

Deco Electronics Inc., Cambridge, Mass.
INVESTIGATION OF IONOSPHERIC OBLIQUE SOUNDER DATA.
Scientific rept. no. 1,
by David Davidson and Robert M. Gallant. 2 Apr 64, 106p
DECO 69P1
Contract AF19 628 3267, Proj. 4603, Task 460309
AFCRL 64 408

Unclassified report

Descriptors: (*Atmospheric sounding, Data), (*Ionospheric propagation, Radio waves), Ionosphere, Atmospheric models, High frequency, Radio transmission, Electron density, Curve fitting, Hamiltonian, Equations, Programming (Computers), Anolog computers.

During October and November 1962 simultaneous vertical HF ionospheric soundings were taken at Midway, Johnston and Palmyra Islands. This report uses the observed vertical soundings to predict oblique propagation by means of four methods for the Midway-Palmyra path (3000 km). The first two transmission curve methods predicted MUF results which averaged four percent higher than observed. The third and fourth methods predicted MUF by means of ray tracing on an analog computer with the Hamilton ray equations. The third method used the electron density at path midpoint only and predicted results which averaged eight percent higher than observed. The fourth method used electron density interpolated between the path end-points and midpoints to predict results which were one percent higher than observed. Additionally, differential path delays were computed and compared to observations. Some estimates were also made of absorption over the ray path. (Author)

AD-602 414 Div. 2, 25
OTS Prices: HC $2.00/MF $0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
REFLECTION AND TRANSMISSION COEFFICIENTS AT THE INTERFACE ICE-SOLID,
by Hans Roethlisberger. May 64, 28p
Proj. 022 01 034, Task 8X99 27 001 03
CRREL RR110

Unclassified report

Descriptors: (*Ice, Wave transmission), Seismic waves, Energy, Compressive properties, Velocity, Solids, Geodesics, Programming (Computers), Glaciers, Surfaces.

Nafe's presentation of reflection and transmission coefficients at a solid-solid interface was used to compute tables for the case of ice in contact with another solid at a plane interface. Energy ratios of all the combinations of reflected and refracted plane P and S waves were computed for 30 different cases of the second solid. A compressional velocity of 3.6 km/sec, a density of 0.9 g/cu cm, and a value of 1/3 for Poisson's ratio were assumed for the ice. For the other solid, the velocity ranged from 1.2 to 6.0 km/sec, the density from 1.5 to 3.0 g/cu cm, and Poisson's ratio from 0 to 1/3. The computations were carried out with an electronic computer, and the results are presented graphically. (Author)

AD-602 418 Div. 2, 1, 33
OTS Prices: HC $6.00/MF $1.50

Bollay (E) Associates, Inc., Santa Barbara, Calif.
PERFORMANCE CRITERIA FOR THE COMMON AVIATION WEATHER SYSTEM. VOLUME TWO. APPENDICES.
Final rept.
1 Dec 62, 276p
Contract FAA BRD139, Task 10

Unclassified report

Descriptors: (*Civil aviation, Weather forecasting), (*Weather forecasting, Civil aviation), Weather communications, Performance (Engineering), Airports, Meterological instruments, Meterological parameters.

Contents: determining the system temporal performance figure-of-merit; Listing of civil and military terminals located in the continental U. S.; preliminary investigation of data requirements for numerical weather prediction; tabulated influence functions for surface and upper-air observations; scoring functions for observing subsystem sensors; current (1962) meteorological forecasting capability.

AD-602 419 Div. 2
OTS Prices: HC $7.00/MF $1.75

Travelers Research Center, Inc., Hartford, Conn.
SUPPLEMENT TO AN EVALUATION OF 2-7-HR AVIATION TERMINAL-FORECASTING TECHNIQUES.
Technical pub. no. 23, suppl.,
by Isadore Enger, Lawrence J. Reed, and James E. MacMonegle. Nov 62, 343p TRC 7044 46
Contract FAA BRD363, Proj. 204 1

Unclassified report

Descriptors: (*Weather forecasting, Reliability), Meteorology, Climatology, Tables, Statistical data, Probability, Statistical analysis, Airports.

The main body of the report (AD-413 049) contains a description of the extensive procedure used to test and evaluate certain statistical terminal-weather forecasting techniques and a summary evaluation of the results. The supplement contains details of the test too lengthy for inclusion in the main part, some items of interest in themselves but of peripheral importance to the central purpose of the test, and a large number of contingency tables of forecast-vs-observed values.

AD-602 434 Div. 2, 20
OTS Prices: HC $2.00/MF $0.50

California Univ., Berkeley.
OBSERVATIONS ON THE RELATIONSHIP OF ENERGETIC PARTICLE PRECIPITATION TO AURORAL ZONE PHENOMENA.
Scientific rept.,
by J. R. Barcus. Jun 64, 40p
Grants AF AFOSR62 422; AF AFOSR331 63

Unclassified report

Descriptors: (*Aurorae, Electrons), Charged particles, X-rays, Meteorological balloons, Radiation measurement

2. Astronomy, Geophysics and Geography

AD-602 328 Div. 2
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DISCRETIZATION IN GALACTIC STRUCTURE AND COSMOLOGY,
by T. Y. Thomas. Jul 64, 57p RM-3990RC
Unclassified report

Descriptors: (*Galaxies, Relativity theory), (*Relativity theory, Galaxies), Celestial mechanics, Statics, Trajectories, Wave functions, Transformations (Mathematics), Differential equations.

The memorandum contains the groundwork of a relativistic theory for the explanation of the discretization effects in the structure of galaxies. The basic assumption, which is referred to as the principle of similarity, expresses in invariant differential form the well-known geometrical concept of the similarity transformation and leads to metrics which appear to be somewhat more general than those in common use in cosmological theory. This principle also leads to the introduction of a wave function which can be interpreted as directly representative of the deviations from a statical metric that occur within the galaxian world tubes or on their boundaries as the result of the action of extraneous influences. It is found that certain discretization effects are required for the existence of solutions of the wave equation satisfied by the wave function under steady-state conditions; this is discussed briefly for the special case of spherical galaxies. (Author)

AD-602 350 Div. 2, 1, 24
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AFA-TEU AIRCRAFT CAMERA AND ITS TESTS,
by V. B. Il'in and V. D. Derviz. 10 Jun 64, 24p
FTD MT63 353 TT 64 11876
Unclassified report

Edited machine trans. of Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii. Trudy (USSR) 1961, no. 146, p. 3-15.

Descriptors: (*Aerial cameras, Photogrammetry), USSR, Photographic images, Aircraft equipment, Maps, Geodesics, Photographic equipment, Topographic cameras, Tests.

As a result of investigations it was established that aircraft camera of the AFA-TEU type possesses following special features: 1. It allows us to do aerial photographic survey on all scales required for composition of topographic maps. 2. It expands possibilities of application during aerial photographic survey of highly sensitive and also colored and spectrozonal photomaterials. 3. It allows us to obtain aerial negatives with practically constant integral density and increased photographic quality and to automate their photolaboratory processing. 4. It ensures higher quality of straightening of aerofilm in a plane. 5. It increases the accuracy of measurement of a systematic part of the deformation, taken into consideration with stereophotogrammetric processing. The results of experiments with the AFA-TEU-140 showed that the construction of the aircraft is promising both with respect to further automation of processes of exposure, and also increased accuracy of the aerophotograph. The decrease of dynamic overloads in construction of the shutter and cassette led to increase of reliability of work of the aircraft camera. (Author)

AD-602 353 Div. 2, 8
OTS Prices: HC $6.00/MF $1.50

Puerto Rico Univ., Mayaguez. Coll. of Agriculture and Mechanic Arts.
STUDY OF IONOSPHERIC WINDS. ADDITIONAL DATA ON THE DETERMINATION OF IONOSPHERIC DRIFTS AND TURBULENCE FROM RADIO FADING RECORDS.
Scientific rept. no. 6 (Final),
by Miguel Wiewall, Jr. Jul 62, 278p
Contract AF19 604 2036, Proj. 7663, Task 766304
AFCRL 63 251
Unclassified report

Descriptors: (*Ionosphere, Wind), (*Wind, Ionosphere), Drift, Turbulence, Measurement, Radio waves, Attenuation, Antennas, Antenna configurations, Puerto Rico, Tables, Experimental data, Geophysics.

Additional data is herein presented on ionospheric drifts and turbulence over Mayaguez, Puerto Rico during the year 1959. A new type of receiving antenna system is used and a rough comparison with results obtained with the old system is given. A new concept in the computations is also tried. (Author)

AD-602 388 Div. 2
OTS Prices: HC $4.00/MF $0.75

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
TEMPERATURE REGIME IN THE UPPER LAYERS OVER THE USSR,
by Nina A. Stepanova. 25 Mar 64, 117p
AMC-RA RR TR64 3
Unclassified report

Descriptors: (*Stratosphere, Temperature), (*Tropopause, Temperature), Atmospheric temperature, Diurnal variations, Water vapor, Carbon dioxide, Cosmic rays, Dust, Lapse rate, Measurement, Data, Tables, Graphics, USSR.

This report presents data obtained through the study of temperature conditions in the upper air layers over the USSR. The influence of water vapor, carbon dioxide, and cosmic dust on temperature variations is outlined. While one scientist concluded that cosmic dust is the principal factor stimulating ascending movements of air in the stratosphere, still no agreement exists between scientists as to the laws governing temperature variations in the stratosphere. (Author)

AD-602 401 Div. 2, 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE MECHANISM OF GEOMAGNETIC EFFECTS OF MAJOR EXPLOSIONS,
by A. F. Kovalevskii. 24 Jun 64, 11p
FTD MT64 266, TT 64 11889
Unclassified report

Edited machine trans. of Sibirskii Fiziko -Tekhnicheskii Institut. Trudy (USSR) 1962, v. 41, p. 87-91.

Descriptors: (*Terrestrial magnetism, Explosions), (*Explosions, Terrestrial magnetism), Nuclear explosions, Electrons, Ionization, Shock waves, Magnetic fields, Electric currents, Meteorites, Fission product activity, Propagation, USSR.

There is presented a brief survey of proposed mechanisms of geomagnetic effects of nuclear explosions. On the basis of similarity of effects between nuclear explosions and

AD-602 497 Div. 2
OTS Prices: HC $3.00/MF $0.50

Geophysics Corp. of America, Bedford, Mass.
PRESSURE AND DENSITY SCALE HEIGHTS DEFINING ATMOSPHERIC MODELS.
Scientific rept. no. 5,
by Raymond A. Minzner. Apr 64, 54p GCA TR64 6A
Contract AF19 628 1633, Proj. 7673, Task 76731
AFCRL 64 450

Unclassified report

Descriptors: (*Atomosphere models, Barometric pressure), (*Meteorological parameters, Atmosphere models), Lapse rate, Geophysics, Potential theory, Differential equations.

Pressure scale height, density scale height and their vertical gradients, all defined in terms of geopotential altitude, are compared and related. Constant vertical gradients of both geopotential pressure scale height and geopotential density scale height are seen to exist simultaneously. This situation leads to simply related equivalent expressions for both pressure ratio and density ratio versus geopotential height in terms of the geopotential gradients of either pressure or density scale height. These equations involve series expansions which, for many applications, may be truncated after the first term which is unity. The errors introduced into the pressure and density ratios by such truncation is considered. Simultaneously constant vertical gradients of the geometric versions of both pressure and density scale height are shown to be physically impossible. The implication of this situation on equations for pressure and density ratios in terms of geometric altitude and constant gradients of the geometric forms of pressure and density scale height are considered. (Author)

AD-602 498 Div. 2
OTS Prices: HC $3.00/MF $0.75

Bonn Univ., (West Germany).
INVESTIGATIONS ON THE TROPICAL EASTERLY JET.
Final rept. no. 1,
by Hermann Flohn. [1964], 91p
Contract DA91 591EUC2781

Unclassified report

Descriptors: (*Jet streams (Meteorology), Tropical regions), Wind, Upper atmosphere, Climatology, Atmospheric temperature, Dynamics, Atmospheric motion, Meteorological phenomena, Periodic variations.

Contents: Upper wind climatology, Meridional temperature cross-sections, Dynamics of the tropical easterly jet, The role of the tropical easterly jet in the general atmospheric circulation, Remarks on the synoptic behaviour of the tropical easterly jet.

AD-602 510 Div. 2, 5, 33
OTS Prices: HC $5.00/MF $1.00

Weather System Center, United Aircraft Corp., East Hartford, Conn.
OBJECTIVE AND AUTOMATIC METHODS FOR SYNOPTIC UTILIZATION OF MULTIPLE WEATHER RADAR DATA.
25 Jan 62, 176p WSC F9
Contract FAA BRD367

Unclassified report

Rept. on FAA Weather System Program.

Descriptors: (*Weather communications, Meteorological radar), (*Data processing systems, Meteorological radar), (*Meteorological radar, Data processing systems), Data transmission systems, Coding, Doppler radar, Economics, Costs, Feasibility studies, Digital systems, Automation, Air traffic control systems, Photographs, Photographic equipment, Display systems, Radar scanning.

A discussion of various methods which are applicable to the objective and automatic collection of multiple weather radar data for synoptic utilization is covered. The discussion includes: technique and hardware status, initial and maintenance cost estimates, age of data comparison, data format comparison, feasibility demonstration of the techniques considered; using a seven station network in the midwest terminating at Kansas City (MKC) and the system recommended, for further consideration and test, as an integral portion of the common aviation weather system.

AD-602 518 Div. 2, 8
OTS Prices: HC $1.00/MF $0.50

Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
THE UNIVERSITY OF ILLINOIS RADIO TELESCOPE.
Progress rept. no. 20, 1 Apr-30 Jun 64.
10 Jul 64, 7p
Contract Nonr1834 22

Unclassified report

In cooperation with the Graduate Coll. and the Dept. of Astronomy of the Univ. of Illinois.

Descriptors: (*Radio astronomy, Instrumentation), (*Telescopes, Radio astronomy), Digital recording systems, Data processing systems, Radio towers, Reflectors, Antennas, Noise (Radio), Parametric amplifiers, Maintenance, Radio interferometers, Radio interference, Clocks.

The radio telescope was in operation during the entire report period. The difficulties with electronic equipment experienced during the previous period have been remedied and data were acquired during all suitable observing periods. An additional tuning-fork-controlled sidereal clock was constructed and placed in operation, preparatory to the installation of digital recording equipment. Studies of possible data-digitizing schemes were continued and one such scheme was chosen as a first experiment. Routine maintenance of the reflector and tower structure was continued at the accelerated rate which is usual in summer. Analysis of the data was continued at an accelerated rate, and various computer programs to assist in this work were written and checked. (Author)

AD-602 535 Div. 2
OTS Prices: HC $2.00/MF $0.50

Army Map Service, Washington, D. C.
THE PARALLAX OF THE MOON IN TERMS OF A WORLD GEODETIC SYSTEM,
by Irene Fischer. 1963, 45p

Unclassified report

Presented to the General Assembly (13th) of the International Union of Geodesy and Geophysics, Berkeley, California, August 1963.

Descriptors: (*Moon, Geodesics), (*Astronomical geodesics, Moon), Geophysics, Astrophysics, Distance-measuring equipment.

Contents: The transit observations of mosting A, The geodetically computed distance between the observatories, Hansen's value of mean parallax, The geometric parallax as referred to the astrogeodetic world datum, The dynamical parallax, The lunar distance from occultations, The lunar distance from radar measurements.

systems, Atmospherics, Alaska, Meteorology, Geophysics, Nuclear physics.

A series of instrumented balloon flights was made from Barrow, Alaska, to study the relationship of electron precipitation to auroral zone phenomena. Observations and results are presented on the relationship of energetic electrons to visual aurora, auroral absorption, and to geomagnetic pulsations.

AD-602 443 Div. 2, 8
OTS Prices: HC $3.00/MF $0.75

Friez Instrument Div., Bendix Corp., Baltimore, Md.
DEVELOPMENT OF THE AN/AMQ-21 MULTICHANNEL RADIOSONDE.
Final rept., for Apr 63-Mar 64,
by S. L. Ashford and W. P. Gleisner. Jun 64, 91p
Contract AF19 628 2834, Proj. 6682, Task 668201
AFCRL 64 326

Unclassified report

Descriptors: (*Radiosondes, Design), Meteorological instruments, Meteorological balloons, Atmospheric temperature, Humidity, Refractive index, Telemeter systems, Circuits, Telemetering antennas, Environmental tests, Flight testing.

The development of the AN/AMQ-21 Continuous Transmission Multichannel radiosonde for use with Rawin Set AN/GMD-2 for meteorological soundings is described. Primary functions of the radiosonde are the measurement of slant range, temperature, humidity and the provision for using an index of refraction sensor. It is a balloon borne ground launched device, transmitting all data simultaneously on a standard radiosonde carrier frequency. The report includes design considerations, descriptions of the radiosonde electronic system, discussion of associated antenna development, results of environmental and flight tests, and recommendations for additional developmental work. (Author)

AD-602 458 Div. 2, 25
OTS Prices: HC $1.00/MF $0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
STRUCTURAL CONTROL OF THE VERTICAL VARIATION OF THE STRENGTH OF SEA AND SALT ICE,
by W. F. Weeks and A. Assur. Apr 64, 21p
Task 8X99 27 001 03
CRREL RR-113

Unclassified report

Descriptors: (*Ice, Tensile properties), Sea water, Freezing, Models (Simulations), Crystal structure, Sodium compounds, Chlorides.

The vertical variation in the strength of sea ice was studied by using data from NaCl ice which shows a structural similarity to sea ice and has straightforward phase relations. Measurements show that the plate spacing is a linear function of the sixth root of the distance below the upper ice surface (z). Available values of the same parameter for natural sea ice are in good agreement with this relation. Equations giving the dependence of the ring-tensile strength of the ice on z were developed. It is demonstrated that in NaCl ice sheets the systematic increase in the plate width with depth produces significant changes in the ring-tensile strength of the ice. Field tests previously performed indicate that similar relations hold for sea ice.

AD-602 475 Div. 2
OTS Prices: HC $3.00/MF $0.75

Woods Hole Oceanographic Institution, Mass.
CURRENT STUDIES SOUTH OF BERMUDA,
by John G. Bruce, Jr. Feb 64, 70p
WHOI Ref-64 5, ARTEMIS-37
Contracts Nonr2866 00, Nonr266 66, Proj. NR287 004

Unclassified report

Reissued from Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.

Descriptors: (*Ocean currents, Measurement), Bermuda, Oceanographic data, Tables, Temperature, Salinity, Laminar flow, Velocity, Towed bodies, Oceanographic equipment.

Subsurface current measurements made south of Plantagenet Bank, Bermuda, indicated a steady mean current field over a two week period during July 1961, flowing approximately in a westerly direction. Measurements were made using drogues, free instruments, and hydrographic stations. The use of the free instrument, a device for measuring horizontal water transport by sinking to a predetermined depth and returning to the surface, is described. A region of laminar flow was indicated up current and around the edges of the bank, and a turbulent region was found to exist just down current of the bank edge. Surface currents of about 25-35 cm/sec. were found, while with increasing depth there was a gradual decrease in velocity, the mean velocity being 10-12 cm/sec. between 600 fathoms and the bottom. (Author)

AD-602 491 Div. 2
OTS Prices: HC $5.00/MF $1.00

Texas A. and M. Univ., College Station.
PETROLOGY AND PETROGRAPHY OF THE CAMPECHE LITHIC SUITE, YUCATAN SHELF, MEXICO.
Progress rept.,
by James L. Harding. May 64, 164p TAMU Ref-6411T
Contract Nonr2119 04; Grant NSF G24892,
Projs. 286A; 323
AD 601 218

Unclassified report

Descriptors: (*Geology, New Mexico), (*Petrology, Limestone), (*Petrography, Limestone), Marine geology, Sedimentation, Carbonate minerals, Structural geology, Stratigraphy, Paleoecology, Mexico Gulf.

The Campeche Bank, which constitutes the northwestern portion of the continental shelf of the Yucatan Peninsula of Mexico, is an area characterized by Recent carbonate sedimentation. The shelf is composed of Pleistocene-Tertiary indurated limestones overlain by an unconsolidated sediment veneer, only part of which is modern sedimentary material, the bulk being relic sediments associated with the sea levels of the Pleistocene-Holocene fluctuations. Over 1000 core and grab samples of this veneer were collected from Texas A and M research vessel Hidalgo. Fragments of lithified carbonate rocks occurred in most of these samples, and were interpreted as representing true lithoclasts, having been torn by some process from the indurated limestones beneath the veneer. The lithic fragments were removed from the samples and thin-sectioned for petrographic study. The results of their examination were used to reconstruct the more recent paleogeographic history of the area, and to investigate the early diagenetic changes that occur in carbonate rocks. Petrographic analysis resulted in the division of the lithic fragments into six textural groups: (1) biomicrites; (2) biosparites; (3) oomicrites; (4) oosparites; (5) mudstones and (6) boundstones.

Descriptors: (*Space environmental conditions, Data), (*Space medicine, Astronauts), (*Space biology, Microorganisms), (*Aurorae, Terrestrial magnetism), Upper atmosphere, Satellites (Artificial), Radioastronomy, Manned spacecraft, Night sky, USSR.

AD-602 616 Div. 2
OTS Prices: HC $4.00/MF $0.75

Air Force Cambridge Research Labs., Bedford, Mass.
CELESTIAL BACKGROUND RADIATION. I. A REVISED SCALE OF BOLOMETRIC CORRECTIONS.
Air Force Surveys in Geophysics,
by Russell G. Walker. Mar 64, 123p
Proj. 7670
AFCRL 64 169 I; AFCRL AFSG155 I
Unclassified report

Descriptors: (*Bolometers, Calibration), (*Stars, Spectroscopy), Thermal radiation, Background, Standards, Photoelectric effect, Colors, Models (Simulations), Reviews.

A short review is given of the literature pertinent to the bolometric correction. A recommended scale of bolometric corrections is presented based upon recent model atmospheres for stars of early spectral type, and upon stellar energy distributions synthesized from photoelectric observations of stars later than FO V. The reduction of various photoelectrically determined magnitude and color systems to a common system and the further reduction of these measurements to absolute energy units is discussed in some detail. (Author)

AD-602 653 Div. 2, 20
OTS Prices: HC $2.00/MF $0.50

Milan Univ. (Italy).
MEASUREMENT OF THE COSMIC RAY NEUTRON FLUX AT 45 DEGREES GEOMAGNETIC LATITUDE.
Technical rept.
by G. Boella, G. Degli Antoni, C. Dilworth, M. Panetti, and L. Scarsi. 11 May 64, 40p
Grant AF EOAR63 106
AFCRL 64 487
Unclassified report

Descriptors: (*Cosmic rays, Neutron flux), (*Neutron flux, Cosmic rays), Albedo, Neutrons, Atmosphere, Measurement, Meteorological balloons, Neutron detectors, Geophysics, Nuclear physics, Italy.

In a series of balloons flights with a light-weight neutron detector, the flux of the cosmic ray neutrons in the atmosphere, at 45 degrees geomagnetic latitude, was investigated. The energy spectrum proposed by Newkirk (1963) was found to be in agreement with the experimental results. Values of the neutron flux through the atmosphere are given and, by extrapolation to zero pressure, the neutron leakage was determined as (0.45 ± 0.07) neutron sq. cm sec. at the top of the atmosphere. A detailed study of the previous experiments on albedo neutrons which led to conflicting results was made and was shown that the apparent discrepancies can be accounted for by instrumental bias and locally produced neutrons. (Author)

AD-602 655 Div. 2
OTS Prices: HC $2.00/MF $0.50

Kiruna Geophysical Observatory (Sweden).
AURORAL ZONE IONOSPHERIC RESEARCH.
Annual summary rept. for 1 Mar 63-29 Feb 64,
by Ludwik Liszka and Alv Egeland. 20 Mar 64, 40p
Contract AF61 052 678
AFCRL 64 353
Unclassified report

Descriptors: (*Aurorae, Ionosphere), (*Ionosphere, Aurorae), Magneto-optic effect, Scintillation counters, Electrons, Terrestial magnetism, Electromagnetic waves, Audiofrequency, Background, Extraterrestrial radio waves, Measurement, Geophysics, Sweden.

The research was carried out with emphasis on Faraday rotation and scintillation phenomenon. It was found from Faraday rotation studies that the direction of the horizontal component of the geomagnetic field in the F-region differs by about 8 degrees from that at ground level. Increases of the rate of Faraday rotation observed in the auroral zone were explained in terms of large horizontal variations of the total electron content. It was found that the amplitude of these variations is about one order of magnitude larger than those observed at middle latitudes. Naturally occurring electromagnetic radiation in the audio-frequency range was also studied. The results obtained are to some extent compared with similiar measurements at Sagamore Hill, Mass., USA carried out during the same period. Several emission bands, which are quite distinct from the normal background-signals and are obtained as strong enhancements in portions of the spectrum, have been recorded. (Author)

AD-602 668 Div. 2, 25
OTS Prices: HC $3.00/MF $0.50

Manchester Univ. (England).
OBSERVATIONS OF THE FREQUENCY DEPENDENCE OF POLARISATION OF THE LIGHT OF THE MOON AND OF MARS.
Technical note no. 3,
by David Clarke. 13 Jan 64, 56p
Contract AF61 052 378
AFCRL 64 442
Unclassified report

Descriptors: (*Polarization, Astrophysics), (*Moon, Optical properties), (*Mars, Optical properties), Planets, Light, Optics, Curve fitting, Graphics, Equations, Tables.

Polarisation measurements were made on different regions of the Moon and disc of Mars in different wavebands under several phase angles. A new effect of the rotation of the direction of vibration of the polarisation was discovered for the planet Mars. (Author)

AD-602 711 Div. 2, 28
OTS Prices: HC $1.00/MF $0.50

United Aircraft Corporate Systems Center, Farmington, Conn.
HUMAN ENGINEERING CONSIDERATIONS IN TACTICAL METEOROLOGICAL EQUIPMENT,
by Stephen D. Benson and Robert L. Hilgendorf.
Jun 64, 14p
Contract AF19 628 3357
ESD TDR64 437
Unclassified report

This rept. was presented at the meeting of the Army Integrated Meteorological System Coordinating group (10th), held 21 May 64, at the 433L System Program Office, Waltham, Mass.

Descriptors: (*Human engineering, Meteorological instruments), (*Meteorological instruments, Human engineering), Systems engineering, Instrumentation, Mobile, Weather stations, Cloud height indicators, Wind direction indicators, Design, Specifications, Standardization, Military requirements.

AD-602 538 Div. 2, 12
OTS Prices: HC $3.00/MF $0.75

Douglas Aircraft Co., Inc., Santa Monica, Calif.
EARTH-TO-MOON TRAJECTORIES IN THE RESTRICTED THREE-BODY PROBLEM.
Engineering paper,
by P. A. Lagerstrom and J. K. Kevorkian.
[2 May 63], 60p DAC EP1646
Grant AF AFOSR62 256
AFOSR J886

Unclassified report

Descriptors: (*Trajectories, Perturbation theory), (*N-body problem, Trajectories), Orbital trajectories, Earth, Moon, Particles, Energy, Time, Gravity, Velocity, Momentum, Boundary layer, Integrals, Differential equations, Polynomials, Functions, Celestial mechanics, Space flight.

Motion of a particle of negligible mass from the neighborhood of a gravitational center (the 'earth') of mass (1-mu) to the neighborhood of a second center (the 'moon') of mass mu is studied within the framework of the restricted three-body problem by asymptotic methods for the case mu < < 1.

AD-602 540 Div. 2
OTS Prices: HC $2.00/MF $0.50

Chicago Univ., Ill.
THUNDERSTORMS AND THE LOW-LEVEL JET.
Research paper no. 22 (Final),
by William D. Bonner. Oct 63, 30p
Contract DA36 039sc88932

Unclassified report

Rept. on Mesometeorology Proj.

Descriptors: (*Thunderstorms, Jet streams (Meteorology), (*Jet streams (Meteorology), Thunderstorms), Weather forecasting, Air mass analysis, Meteorological parameters, Correlation techniques, Micrometeorology, Kansas, Oklahoma, Missouri, Nebraska.

The relationship between the low-level jet and thunderstorm activity in the south-central United States is examined through mesoanalysis of surface data from Weather Bureau and NSSP stations. Separate squall systems were found to move through Kansas and Oklahoma during the night; the systems in Kansas persisted, while those in Oklahoma died out. The reason for this seemed to be associated with the vertical velocity fields at low levels. It is postulated that the orientation of thunderstorms with respect to the jet maximum may be an important factor in determining whether or not they will survive for any appreciable period of time. (Author)

AD-602 541 Div. 2
OTS Prices: HC $3.00/MF $0.50

Chicago Univ., Ill.
ON THE LOW-LEVEL STRUCTURE OF A SQUALL LINE.
Research paper no. 21 (Final),
by Henry Albert Brown. Oct 63, 55p
Contract DA36 039SC88932

Unclassified report

Rept. on Mesometeorology Proj.

Descriptors: (*Atmospheric motion, Air mass analysis), (*Air mass analysis, Atmospheric motion), Meteorological parameters, Humidity, Atmospheric temperature, Wind, Meteorological instruments, Operation, Texas.

The design of a field operation which took place during the month of May, 1962, in the Dallas-Fort Worth, Texas, area is described. The purpose of the operation was to obtain moisture, temperature, and wind observations in the low-levels of a squall line. The Cedar Hills television tower (1420') proved to be an ideal location for such an operation. In addition to the instrumentation already mounted on the tower, temperature and moisture were sampled continuously at six levels. Surrounding the tower, small scale and mesoscale networks were maintained for a horizontal capability. The operational results are catalogued in the analysis of a squall line which passed the area on May 28-29, 1962. High-level time and space sections revealed the environmental conditions, while low-level sections of wind, moisture, and temperature revealed the structure of the squall line. Results of the study indicated that the moisture anomaly, referred to as a 'humidity dip', increases in magnitude with height. Another feature noted was the existence of a low-level moisture maximum located just ahead of the squall line. (Author)

AD-602 546 Div. 2, 5
OTS Prices: HC $3.00/MF $0.75

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
RESEARCH ON SPREAD-F STUDIES.
Final rept.
by John R. Herman. 31 Jan 64, 86p RAD TR64 9
Contract AF19 628 2788, Proj. 4603, Task 460304
AFCRL 64 65

Unclassified report

Descriptors: (*Ionospheric disturbances, Terrestrial magnetism), Radiofrequency interference, High frequency, Gas ionization, Photochemistry, Polar regions, Electron density, Radio astronomy, Atmospheric sounding.

The results of ionospheric observations using a variety of techniques are summarized to show that magnetic-field-aligned irregularities exist in the ionosphere. A critique of theories explaining why the irregularities cause spread echoes is given. Statistical studies of the geographic and temporal variations in spread-F occurrence are summarized. The fundamental question of how irregularities causing spread F are produced in the ionosphere is discussed. It is suggested that incoming charged particles traveling down magnetic-field lines to F-region heights create field-aligned ionization which is masked during the day by photoionization. The proposed mechanism is supported by observational results in polar regions. A theoretical treatment of the formation of the ionosphere over the pole at winter solstice indicates that photoionization alone is inadequate to explain observed electron densities in the F layer, and an additional production mechanism such as incoming charged particles is needed. A study of traveling disturbances at high latitudes reveals that the phenomenon is invariably followed by spread-F conditions. An analysis of WWV reception at high latitude is discussed to show the effects of spread F on high-frequency (HF) communications circuits. (Author)

AD-602 594 Div. 2, 16
OTS Prices: HC $3.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATIONS OF COSMIC SPACE AND THE UPPER LAYERS OF ATMOSPHERE; FLIGHTS OF SHIPS 'VOSTOK-5' AND 'VOSTOK-6'; COSMOS AND LIFE; AURORA POLARIS AND RADIATION OF THE NIGHT SKY,
by A. A. Blagonravov, V. G. Denisov, A. A. Imshenetskii, and V. I. Krasovskii. 9 Mar 64, 53p
FTD MT63 256; TT 64 11965

Unclassified report

Edited machine trans of A[kademiya] N[auk] SSSR. Vestnik, 1963, [v. 33] no. 9, p. 9-32.

induced in vertical loop antennas by the surface and downcoming sky waves along the perpendicular bisector. A simple expression for the ratio of these emf's involves the ground distance from transmitter to receivers, the angle of incidence of the wave on the ionosphere, and the ionospheric reflection coefficient. The effects of nonhomogeneous ground conductivity were also examined and were found to influence the magnitude of the ratio of surface-wave field to sky-wave field. (Author)

AD-602 828 Div. 2
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
ANNUAL SUMMARY REPORT. [WZ OPHIUCHI AND OTHER SOLAR-TYPE STARS AND PHYSICAL DATA FROM NORMAL BINARIES AND THE MASS-LUMINOSITY RELATION.].
Rept. for 1 May 63-30 Apr 64.
1964, 5p
Contract Nonr3507 00, Proj. NRO46 790
Unclassified report

Paper to be presented at 12th Annual Assembly of International Astronomical Union, Hamburg, summer, 1964.

Descriptors: (*Binary stars, Physical properties), Stars, Spectra (Visible and Ultraviolet), Photoelectric effect, Orbital trajectories, Optical properties, Astrophysics, Astronomical data.

The investigation of eclipsing binaries for which the most reliable masses and radii can be obtained is continued with analysis of the systems WZ Oph, F8, VZ Hya, F5, and UV Leo, G2. New spectrographic orbits were determined for all three systems, and a photoelectric light curve was obtained for WZ Oph. Attention is also given to superficial physical effects in close binary systems which may have important consequences in their spectra, so that difficulties are encountered in attempting to evaluate with any degree of precision from the observations the fundamental physical properties of the component stars. Attention is concentrated on those systems for which the properties can be evaluated unambiguously. Problems of eclipsing binaries are stressed, with visual binaries referred to less prominently.

AD-602 851 Div. 2
OTS Prices: HC $4.00/MF $1.00

General Mills, Inc., Minneapolis, Minn.
TROPICAL UPPER AIR STUDIES. PART I. PERSISTENCE OF THE DAILY STRATOSPHERIC WINDS IN THE TROPICS. PART II. LONG-PERIOD WIND FLUCTUATIONS IN THE TROPICS.
Final rept. for 30 Mar 62-30 Mar 64,
by A. D. Belmont, W. C. Shen, and D. G. Dartt.
1 Apr 64, 133p GMI 2562
Contract DA36 039SC89211
Unclassified report

Descriptors: (*Tropical regions, Winds), (*Wind, Tropical regions), (*Stratosphere, Tropical regions), Meteorological phenomena, Meteorological charts, Atmospheric motion, Weather forecasting, Atmospheric temperature, Troposphere, Velocity, Oscillation, Energy, Harmonic analysis, Correlation techniques, Stochastic processes, Spectroscopy.

The persistence of tropical 50 mb daily wind direction and speed along with the daily zonal component was computed to determine the interval over which a wind observation may be regarded as 'independent'. Monthly means of the zonal component were determined using only 'independent observations' and then compared to monthly means based on all available data. Long period fluctuations of the stratospheric zonal winds in the tropics were examined to describe variations in the observed monthly mean patterns. The quasi-biennial and annual fluctuations account for practically all the observed wind variability; the meridional and vertical variation of the amplitudes as well as the difference in phase propagation downward of each of these two components cause the complex interference patterns that are observed with time at various subtropical and tropical stations. (Author)

AD-602 884 Div. 2, 30
OTS Prices: HC $3.00/MF $0.75

Kiruna Geophysical Observatory (Sweden)
KIRUNA GEOPHYSICAL DATA.
Data summary 63/3, Jul-Sep 63.
1963, 77p
Unclassified report

Supported in part by European Office, Office of Aerospace Research.

Descriptors: (*Geophysics, Sweden), (*Sweden, Geophysics), Physics laboratories, Scientific research, Upper atmosphere, Polar regions, Data, Cosmic rays, Ionosphere, Absorption Aurorae, Radar echo areas, Very low frequency, Radio waves, Ionospheric propagation, Scientific satellites, Terrestrial magnetism, Tables.

A collection of results of measurements carried out at Kiruna Geophysical Observatory is presented. The objective of this data summary is to present current geophysical data related to polar upper atmosphere conditions. The coordinates of the Observatory are 67.8 degrees N, 20.4 degrees E, geographically, and 65.3 degrees N, 115.5 degrees E, geomagnetically. Data obtained at Kiruna Geophysical Observatory, which are regularly published by other groups in Sweden, have not been included in this collection. (Author)

AD-602 904 Div. 2
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
RADIO ASTRONOMICAL OBSERVATIONS OF VENUS WITH HIGH RESOLVING POWER,
by D. V. Korol'kov, Yu. N. Parijskii, G. M. Timofeeva, and S. E. Khaikin. 1963, 8p
NRL Trans-936, TT 63 11647
Unclassified report

Radioastronomicheskie Nablyudeniya Venery s Vysokoi Razreshayushchei Sposobnost'yu, trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 149, no. 1, p. 65-67.

Descriptors: (*Venus, Radio astronomy), (*Radio astronomy, Venus), Astrophysics, Extraterrestrial radio waves, Planets, Physical properties, Measurement, Telescopes, Resolution.

During October-November of 1962 observations were carried out of the radio emission from Venus on 3.02 cm wavelength by means of a large Pulkovo radio telescope with a variable profile antenna. The purpose of these investigations was to evaluate the nature of the distribution of radio brightness, by using high resolving power and high precision of the coordinate measurements with a variable profile antenna. A divergence between the optical and radiomethods cannot be explained by the presence of high radiation belts as in the case with the Jupiter. Radio emis-

This report concerns human capabilities and limitations as they interface with the operation, maintenance and control of tactical meteorological equipment. It discusses several pieces of tactical meteorological equipment and relates to these equipment their major 'Human Engineering' problems and concerns. (Author)

AD-602 719 Div. 2, 32
OTS Prices: HC $3.00/MF $0.75

Aerospace Technology Div., Washington, D. C.
TERRESTRIAL UTILIZATION: COMPILATION OF ABSTRACTS.
Rept. no. 2.
15 Jul 64, 68p
ATD P64 45, TT 64 71124
Unclassified report

Surveys of Soviet-bloc scientific and technical literature.

Descriptors: (*Soils, Abstracting), (*Abstracting, Soils), Rock (Geology), Test methods, Symposia, Stability.

One hundred references with abstracts are listed under the following topics: Soviet definition of 'soil' and 'ground'; natural soils and ground; melioration of soils and ground; stabilization methods; Soviet melioration practice; testing methods, techniques and equipment; conferences. (Author)

AD-602 728 Div. 2, 30
OTS Prices: HC $2.00/MF $0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A COMPUTER PROGRAM FOR AUTOMATIC STAR IDENTIFICATION.
by Anojean Wagner. Dec 63, 36p
Proj. 1E2502060240
BRL MR1535
Unclassified report

Descriptors: (*Stars, Identification), (*Programming (Computers), Astronomical data), Astrophysics, Information retrieval, Catalogs, Magnetic tape, Position finding, Cameras, Calibration, Photogrammetry.

This report describes an automatic star identification program. The identification of stars is obtained from the Boss Catalogue data recorded on magnetic tape, and standard coordinates are computed. The output format is compatible with the input format of the camera orientation programs. (Author)

AD-602 744 Div. 2, 6
OTS Prices: HC $3.00/MF $0.50

Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Technical rept. no. 9, 1 Oct 63-31 Mar 64,
by A. L. Sims and E. A. Mueller. 31 Mar 64, 55p
Contract DA36 039sc87280, Task 3A99 07 001 01
Unclassified report

Descriptors: (*Meteorological radar, Atmospheric precipitation), (*Atmospheric precipitation, Meteorological radar), Rainfall, Raindrops, Measurement, Radar echo areas, Radar signals, Attenuation, Radar reflections, Cameras, Data, Meteorology, Radioactive fallout, Trafficability, Communication theory.

The operational programs for the radars and raindrop cameras are proceeding normally. The M-33 acquisition radar is being used with step gain, at present. The drop cameras have been installed but are not yet ready for data collection. The proposal for measuring radar attenuation and reflectivity to determine rainfall rate is investigated and found to yield no significant gain in estimate reliability. A method for attenuation correction is proposed and evaluated. It appears to be useful for a majority of storms. The 1963 drop-size data from the East Central Illinois Network are presented in brief. Generally no differences in the R-Z relationship for a 2-mile separation of sampling points was found. (Author)

AD-602 778 Div. 2, 30, 32
OTS Prices: HC $6.00/MF $1.25

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
BIBLIOGRAPHY ON SNOW, ICE AND PERMAFROST WITH ABSTRACTS. CUMULATIVE INDEX, VOLS. I-XVII.
Jun 64, 261p
CRREL 12
Unclassified report

Descriptors: (*Bibliographies, Cold weather tests), (*Snow, Bibliographies), (*Ice, Bibliographies), Permafrost, Bibliographies), Abstracting, Indexes, Subject indexing.

This cumulative index covers SIPRE and CRREL abstracts 1 to 21,000 which have been published in 17 volumes. The four parts of the work, author, title, patent, and subject indexes supersede the cumulative indexes published in 1955 and 1956. The author index lists the authors of all abstracts produced to June 1963. The title index identifies papers in the above series for which authors are unidentified. The patent index is a listing by subject of all patents abstracted. The subject index consists of approximately four thousand subject headings and cross-references and serves as the subject control for the CRREL Bibliography Project, in addition to its function as a retrieval tool for the reader. The subject coverage for the needs of CRREL and other users is further classified by using topical and geographic subdivisions for the headings. The use of some topics as sub-divisions of other topics has been indicated and cross-referenced as necessary. (Author)

AD-602 804 Div. 2, 8
OTS Prices: HC $2.00/MF $0.50

Navy Electronics Lab., San Diego, Calif.
MAGNETIC COMPONENTS RADIATED BY A HORIZONTAL DIPOLE AT VLF.
Research rept. for Jul 63-Jan 64,
by R. R. Harrington. 4 May 64, 29p
Proj. SR 008 01 01, Task 0401
NEL 1221
Unclassified report

A study of the electromotive forces induced by sky and surface waves in a vertical loop along the perpendicular bisector of a horizontal vlf antenna.

Descriptors: (*Dipole antennas, Very low frequency), (*Ionosphere, Atmospheric sounding), (*Radio waves, Very low frequency), Electromagnetic waves, Reflection, Electron density, Radio transmitters, Radio receivers, Magnetic fields, Antennas.

The electromagnetic radiation characteristics of a horizontal vlf antenna near a semi-infinite conducting plane along its perpendicular bisector were examined. An expression was developed for the electromotive forces

by James D. Horn and Elmer J. Trawle.
Jul 64, 36p
Task 1A0 14501B53A10
ERDA 157

Unclassified report

Descriptors: (*Wind, Low altitude), (*Mountains, Wind), Terrain, Meteorological parameters, Atmospheric motion, Meteorological instruments, New Mexico.

One aspect of investigating the wind structure of the Tularosa Basin is the examination of the effects of nearby mountain ranges on perturbations in the wind field. Charts of standard deviation of low-level wind speed and direction as a function of mean wind speed and mean wind direction ere analyzed. A relation between these values and terrain features such as canyons and mountain barriers is suggested. (Author)

3. Chemical Warfare Equipment and Materials

No Entries

sion is practically absent at a distance of 1.07R from the center of the disk of the planet, i.e. the height of the radiation region does not exceed 420 km above the cloud cover of Venus. The results of measurements of the effective dimensions of Venus are shown. An attempt to determine the phase variations of radio temperature with displacement of the center of gravity of radio emission led to a negative result. The observations agree best of all with the model of a hot surface and cold atmosphere.

AD-602 936 Div. 2, 25
OTS Prices: HC $8.67/MF $2.50

Institut D'Astrophysique, Cointe-Sclessin (Belgium).
INFRARED SPECTRA OF ASTRONOMICAL BODIES. PROCEEDINGS OF THE INTERNATIONAL ASTROPHYSICAL SYMPOSIUM (12th), LIEGE, JUNE 24-26, 1963, 1964, 567p
AFCRL 64 367

Unclassified report

A portion of this document is illegible or nonreproducible. 8% of the text of this rept. is in French.

Descriptors: (*Spectra (Infrared), Solar systems), (*Astrophysics, Symposia), (*Symposia, Astrophysics), Infrared spectroscopy, Solar atmosphere, Solar spectrum, Planets, Stars, Infrared equipment, Absorption spectrum, Belgium, Scientific organizations.

Major topics include: Spectroscopic investigations of astronomical interest (Laboratory and Theory); recent developments in infrared techniques; the solar spectrum; the telluric absorption spectrum; the telluric emission spectrum; and planets and cold stars.

AD-602 950 Div. 2
OTS Prices: HC $3.00/MF $0.50

Oregon State Univ., Corvallis.
TEMPERATURE, SALINITY, AND CURRENT MEASUREMENTS FOR COOS BAY, OREGON, DURING 1960-1963.
Data rept. no. 10,
by W. Bruce McAlister and Jackson O. Blanton.
Oct 63, 52p OSC Ref 63 23
Contract Nonr1286 10; Grant PHS WP217C1,
Proj. NRO83 102

Unclassified report

Descriptors: (*Oceanographic data, Oregon), (*Oregon, Oceanographic data), Bays, Temperature, Salinity, Ocean currents, Oxygen, Measurement, Oceanology.

Temperature, salinity, and current measurements extending over one or more tidal cycles were made at various times during the three-year period 1960-1962 in Coos Bay, on the central Oregon coast. Dissolved oxygen was measured occasionall. The three regular sampling stations are shown. Station A is located at the Coos Bay Pulp and Paper dock south of Empire, Station B at the U. S. 101 Highway bridge, and Station C at the municipal docks at North Bend. On two occasions, midchannel stations along the entire fifteen-mile length of the estuary were sampled. A special current study was conducted in March 1963. Measurements in Coos Bay before 1960 have been reported by Queen and Burt (1955), Burt (1956), and Burt and McAlister (1958). (Author)

AD-602 951 Div. 2
OTS Prices: HC $2.00/MF $0.50

Oregon State Univ., Corvallis.
HYDROGRAPHIC DATA FROM OREGON WATERS, JUNE THROUGH DECEMBER 1961.
Data rept. no. 12,
by Bruce Wyatt and Norman F. Kujala.
Dec 63, 41p OSC Ref 63-33
Contract Nonr1286 10, Proj. NRO83 102

Unclassified report

Descriptors: (*Oceanographic data, Oregon), (*Oregon, Oceanographic data), Hydrographic surveying, Ocean currents, Marine meteorology, Marine geophysics, Oceanographic equipment, Data processing systems, Personnel.

This is the fourth data report of a study designed to determine the current patterns and water mass characteristics along the Oregon coast. The data available in each of the four reports are summarized in Table form. All data in this report were collected at stations occupied by Research Vessel ACONA (Burt and Pattullo, 1961). The sampling operation at each station generally consisted of one hydrographic cast to 800 or 1000 meters, a bathythermograph cast to 200 meters, a Clarke-Bumpus plankton tow to 150 meters, and the release of 12 drift bottles (Burt and Wyatt, 1964).

AD-602 958 Div. 2
OTS Prices: HC $2.00/MF $0.50

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
STRATOSPHERIC SOLAR RESPONSE,
by Willis L. Webb. Jul 64, 40p
Task 1G6 50212A127 03
ERDA 156

Unclassified report

Descriptors: (*Atmospheric sounding, Stratosphere), (*Stratosphere, Atmospheric sounding), Thermal radiation, Solar radiation, Atmospheric motion, Climatology, Meteorological phenomena, Dynamics, Southern Hemisphere, Northern Hemisphere.

Analysis of stratospheric soundings obtained during the first four years of the meteorological rocket network's exploration has provided new insight into the dynamics of stratospheric circulation. The data indicate that the winter storm period from mid-December to mid-February results from interaction between the opposing circulations of the winter and summer hemispheres. Initation of these disturbances occurs in low latitudes of the winter hemishpere when the summer hemisphere circulation reaches its peak and actively invades the winter hemisphere. These disturbances propagate only toward the winter pole and act as an effective brake on the development of the winter westerly circulation. Except for this very pronounced period of dynamic interchanges the stratosphere is found to respond systematically to changes in solar heat input. (Author)

AD-602 959 Div. 2
OTS Prices: HC $2.00/MF $0.50

Army Electronics Research and Development Activity, White Sands Missile Range, New Mex.
OROGRAPHIC EFFECTS ON WIND VARIABILITY,

AD-602 453 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

Midwest Research Inst., Kansas City, Mo.
SYNTHESIS OF ELASTOMERS CONTAINING Si-N BONDS IN THE MAIN CHAIN.
Quarterly progress rept. no. 9, 1 Apr-30 Jun 64, by L. W. Breed and R. L. Elliott. 15 Jul 64, 27p
Contract DA23 072ORD1687, Proj. 2531C

Unclassified report

Descriptors: (*Elastomers, Synthysis (Chemistry)), (*Silicone plastics, Synthesis (Chemistry)), Heat-resistant plastics, Silicon compounds, Organic nitrogen compounds, Alcohols, Heterocyclic compounds, Phenols, Polymers, Hydrolysis, Pyrolysis, Oxidation.

Rubbery products were obtained when silazane-organic diol polymers are heated with compounds containing the cyclotriphosphazatriene ring, but it was not established that the polymers are crosslinked by these reagents. Two new polymers were prepared from cyclotrisilazanes containing ethyl and benzyl groups. Although both polymers had good hydrolytic stability, thermal stability was poor. A detailed examination of the thermal and oxidative stability showed that a nonamethylcyclotrisilazane-bisphenol 'A' polymer was thermally stable at 300C, but underwent oxidative degradation at that temperature. (Author)

AD-602 522 Div. 4
OTS Prices: HC $1.00/MF $0.50

Vanderbilt Univ., Nashville, Tenn.
THE EFFECT OF COORDINATION ON THE REACTIVITY OF AROMATIC LIGANDS.
Progress rept. no. 8 for period ending 31 Mar 64, by Mark M. Jones, Naresh K. Chawla, and Roland C. McNutt. 31 Mar 64, 5p
Grant DA ARO D31 124G490, Proj. 2659C

Unclassified report

Descriptors: (*Complex compounds, Chemical reactions), (*Metalorganic compounds, Chemical reactions), Aromatic compounds, Reaction kinetics, Models (Simulations), Field theory, Copper compounds, Quinolines, Alcohols, Metalation, Mercury compounds, Preservation, Aldehydes, Organic nitrogen compounds, Polarographic analysis.

Summaries are given of research progress in the following areas: electrostatic models for ligand reactions; kinetics of the mercuration of 8-hydroxyquinoline and its copper (II) complex; preservation of aromatic ligands at low pH; polarographic study of 5-nitrosalicylaldehyde..

AD-602 550 Div. 4, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
POLAROGRAPH LP-55,
30 Jul 63, 4p
FTD tt63 693; TT 64 11948

Unclassified report

Unedited rough draft trans. of Czechoslovakian report nr. F:422, Laboratorni Pristroje, N.P., Prague, 3p.

Descriptors: (*Polarographic analysis, Electrical equipment), Electrochemistry, Laboratory equipment, Czechoslovakia.

A description is given of the LP-55 polarograph which utilizes the classical photographic method for automatic plotting of polarographic curves and is destined for most exact polarographic operations with a voltage accuracy of 1.5 mv and a current accuracy of better than 1. (Author)

AD-602 553 Div. 4, 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTROLYTIC PRECIPITATION OF ANTIMONOUS INDIUM,
by V. V. Ostroumov and A. D. Styrkas. 10 Dec 63, 16p
FTD MT63 251; TT 64 11921

Unclassified report

Edited machine trans. of Leningrad U. Vestnik (USSR) 1963 [v. 18] no. 10, Seriya Fiziki i Khimii no. 2 p. 101-107.

Descriptors: (*Semiconductors, Chemical precipitation), (*Indium alloys, Chemical precipitation), (*Antimony alloys, Chemical precipitation), Electrochemistry, Films, Electrodeposition, Cathodes (Electrolytic cells), Sulfates, Phase studies, Heating, USSR.

The possibility of the formation of a semiconductive combination of InSb on a cathode from aqueous sulphate solutions was investigated. Cathode deposits were found to present a mixture of three crystalline phases: that of antimony, indium, and indium antimonide. Subsequent heating resulted in an increase of the indium antimonide phase content at the expense of the antimony and indium phases. (Author)

AD-602 572 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEWS IN REGIONS OF ELECTROCHEMICAL SYNTHESIS OF OXIDIZERS,
by V. C. Khomyakov and M. Ya. Fioshin. 11 May 64, 26p
FTD MT64 183, TT 64 11940

Unclassified report

Edited machine trans. of Khimicheskaya Promyshlennost' (USSR) 1962, no. 1 [p. 30-37].

Descriptors: (*Oxidizers, Synthesis (Chemistry)), Electrochemistry, Electrolytic cells, Electrolysis, Chlorine compounds, Manganese compounds, Oxides, Sulfuric acid, Ammonium compounds, Sulfates, Chromates, Bromine compounds, Iodates, Iodic acid, Borates, Carbonates, Lead compounds, Acetates, USSR.

The world literature dealing with the electrochemical synthesis of oxidizers is reviewed. The new developments basically concern the effective construction of electrolyzers, improvement of flow charts, and intensification of the electrolysis process. Consideration is given to the following groups of compounds: chlorine oxides, persulfuric acid, ammonium persulfate, manganese oxides, bichromates, bromates, iodates, iodic acid, perborates, percarbonates, and lead tetra-acetate. A bibliography of 95 items is included.

AD-602 600 Div. 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

4. Chemistry

AD-602 312 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE OXIDATION OF BRANCHED PARAFFINS,
by P. G. Igonin, V. V. Svitkin, A. A. Kolozhvari, Yu. S. Sleptsov, and E. M. Glotser. 10 June 64, 12p
FTD MT64 02; TT 64 11847

Unclassified report

Edited machine trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) 1963 v. 8 no. 5, p. 34-38.

Descriptors: (*Alkanes, Oxidation), (*Fatty acids, Synthesis (Chemistry)), Organic acids, Molecular structure, Separation, Plasticizers, Surface-active substances, Lubricants, USSR.

The fundamental diagram of the process for obtaining iso-acids is analogous to the diagram obtained for the production of synthetic fatty acids. Acids obtained from branched paraffins consist basically of acids not forming a complex with urea. During oxidation of branched paraffins, a significant quantity of products not soluble in petroleum ester are formed whose acid content is sharply lowered after heat treatment. During oxidation of the 'motoalkilat' fraction acids are formed whose fractions analogous to the fractions of synthetic fatty acids have lower temperatures of solidification and higher acid numbers. (Author)

AD-602 330 Div. 4, 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COMPARATIVE CHARACTERISTICS OF SPECTROPHOTOMETRIC METHODS FOR IDENTIGYING TANTALUM AND NIOBIUM,
by A. T. Pilipenko and O. M. Eremenko. 27 May 64, 16p
FTD TT64 370 TT 64 11856

Unclassified report

Unedited rough draft trans. of Ukrainskii Khimicheskii Zhurnal (USSR) 1963, v. 29, no. 5, p. 532-538.

Descriptors: (*Tantalum, Chemical analysis), (*Niobium, Chemical analysis), Spectroscopy, Absorption spectrum, Ethers, Thiocyanantes, Tungsten, Complex compounds, Spectrophotometers, USSR.

A comparative study was made of spectrophotometric methods for determination of tantalum and niobium with inorganic reagents. A formal molar extinction coefficient was used for comparing methods. Absorption spectra studies were made of compounds of niobium and tantalum and inorganic reagents which were used for their photometric identification. It was found that the best inorganic reagent method for niobium identification is the ether-extraction method. In determination of niobium in the presence of tungsten it is better to apply the thiocyanate method in a water-acetone medium; here the sensitivity decreases but the adverse influence of tungsten is lessened. (Author)

AD-602 342 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ENERGY SPECTRA OF ELECTRONS DETACHABLE IN THE PHOTOIONIZATION OF MOLECULES,
by F. I. Vilesov and B. L. Kurbatov. 14 May 64, 12p
FTD TT64 296; TT 64 11868

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Seriya Fizicheskaya, 1963, v. 27, no. 7, p. 1088-1093.

Descriptors: (*Photochemistry, Ionization potentials), (*Ionization potentials, Distribution), Ions, Electrons, Photons, Energy, Diffraction analysis, Anilines, Naphthalenes, Benzenes, Toluenes, Xylenes, USSR.

An examination was made of the manner in which the quantum energy in excess of the adiabatic ionization potential is distributed between a positive ion and the detachable electron. For this purpose, the distribution of photoionization electrons according to their kinetic energies was studied by the retarding field method. Kinetic energy distribution curves were obtained for aniline, methylaniline, dimethylaniline, naphthalene, benzene, toluene, mesitylene, durene, and o-, p-, and m-xylene.

AD-602 372 Div. 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech, Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COMPOUNDS OF INDIUM WITH GLYCOCOLL,
by A. P. Kochetkov, V. G. Tropev, and O. N. Gilyarov.
3 Jun 64, 10p
FTD MT63 279; TT 64 11880

Unclassified report

Edited machine trans. of Zhurnal Neorganicheskoi Khimii (USSR) 1963, v. 8, no. 3, p. 772-774.

Descriptors: (*Metalorganic compounds, Indium compounds), (*Indium compounds, Glycines), (*Glycines, Indium compounds), Amino acids, Chelate compounds, Organic nitrogen compounds, Chlorides, Synthesis (Chemistry), Molecular structure, Stability, USSR.

A study of synthesized compounds of indium with glycocoll of the composition In(G1H)3C13, In(G1H)2G1C12 and InG13 showed that ring formation increases the thermal stability of compounds, while, as distinguished from the corresponding compounds of gallium (concerning the action of ammonia gas under pressure) the indium -- nitrogen bond both in triglycinate and in triglycinochlorides are equally unstable. (Author)

AD-602 393 Div. 4
OTS Prices: HC $1.00/MF $0.50

Pennsylvania State Univ., University Park.
A QUANTITATIVE SCALE OF ELECTRON ACCEPTOR STRENGTHS FROM F - NMR.
Technical rept. no. 1,
by Robert W. Taft and J. W. Carten. Jul 64, 8p
Contract Nonr656 31

Unclassified report

Descriptors: (*Fluorine, Nuclear magnetic resonance), (*Acid-base reactions, Nuclear magnetic resonance), Benzonitriles, Fluorides, Acids, Bases (Chemistry), Electrons.

The NMR shielding effect of the fluorine atom in p-fluorobenzonitrile served as the basis of preliminary studies directed toward the establishment of an 'intrinsic' scale of electron acceptor strengths of a series of Lewis acids.

Final technical rept.,
by G. E. Philbrook. Jun 64, 24p
Grants AF AFOSR62 73, AF AFOSR44 63
AFOSR 64 1271

Unclassified report

Descriptors: (*Luminescence, Energy conversion), (*Photochemistry, Luminescence), Enzymes, Indoles, N-heterocyclic compounds, Azines, Pyrroles, Synthesis (Chemistry), Purification, Oxidizers, Chlorine compounds, Oxides.

The work covered involved chemical and enzymatic studies on the conversion of chemical energy to light. The initial studies were devoted to studying the methods for the preparation and purification of luminol and its analogs. The second category of work involved the discovery of the chemiluminescence of indole and certain of its derivatives. Extensive studies were made of the relationship between the conditions of the reactions and the intensity of the light emission and to a study of the chemical nature of the chemiluminescent reaction. The third group of studies was devoted to the attempted preparation of cinnolines with the object of determining whether or not these compounds were chemiluminescent. The fourth category involved studies of the action of chlorine dioxide as an oxidizing agent. The fifth category involved the study of the chemiluminescence of lophine and its derivatives.

AD-602 819 Div. 4, 14
OTS Prices: HC $5.00/MF $1.00

Vienna Univ. (Austria).
ADVANCED STUDIES ON SINGLE BINARY AND TERNARY SYSTEMS OF OXIDES WITH HALOGENIDES (FLUORIDES, CHLORIDES ETC.) SULFATES, CARBONATES, NITRATES IN RESPECT TO THE FORMATION OF REFRACTORY COMPOUNDS AND VOLATILE PHASES AND TO THE APPLICATION IN SPECTROCHEMICAL DISTILLATION-METHODS.
Final technical rept. for 1 Feb 62-31 May 64,
by Erich Schroll. 31 May 64, 195p
Contract DA91 591EUC2830

Unclassified report

Descriptors: (*Refractory materials, Thermochemistry), Oxides, Halides, Sulfates, Carbonates, Chemical reactions, X-ray diffraction analysis, Phase studies, Heating, Distillation, Spectroscopy, Austria.

The reactions between oxides, like Al_2O_3, BeO, Cr_2O_3, Fe_2O_3, La_2O_3, MnO2, MoO_3, Nb_2O_5, NiO, Ta_2O_5, ThO2, TiO2, V_2O_5, WO_3, UO2 Y_2O_3, ZrO2, and halogenides, like LiF, LiBr, LiI, NaF, NaCl, NaBr, NaI, KF, KHF2, KCl, KBr, KI, RbCl, CsF, CsCl, CsI, CuF2, CuCl, CuBr2, CuI, AgF2, AgCl, AgBr, AgI, CdF2, CdBr2 CdF2, PbCl2, PbI2, CrF_3, $CrCl_3$, FeF_3, NiF2, MgF_2, CaF_2, SrF_2, BaF_2, $BaCl_2$, AlF_3, GaF_3, LaF_3, and carbonates like, Li_2CO_3, Na_2CO_3, $MgCO_3$, $CaCO_3$, $SrCO_3$, $BaCO_3$ and sulfates like, Li_2SO_4, Na_2SO_4, $CaSO_4$, $BaSO_4$, $PbSO_4$ were studied. The reaction products were identified with aid of x-ray-diffraction. The patterns of more than 25 unknown or supposed compounds were recorded.It was found, that the reactions could be predicted by thermodynamical calculations.

AD-602 862 Div. 4, 3
OTS Prices: HC $2.00/MF $0.50

Laboratories for Research and Development,
Franklin Inst., Philadelphia, Pa.
A NEW TYPE OF POLYMERIZATION INVOLVING ORGANOPHOSPHORUS COMPOUNDS AS CATALYSTS.
Quarterly progress rept. no. 3, 1 Dec 63-28 Feb 64,
by H. Scott, T. P. Konen and M. M. Labes.
10 Mar 64, 30p
Contract DA18 108AMC169

Unclassified report

Descriptors: (*Toxic agent alarms, N-heterocyclic compounds), (*Organic phosphorus compounds, Catalysts), (*N-heterocyclic compounds, Polymerization), Pyrroles, Catalysts, Phosphoric acids, Phosphates, Reaction kinetics, Organic solvents, Nitriles, Halogenated hydrocarbons, Storage.

The program is concerned with determining the feasibility of using a newly found polymerization of N-vinylcarbazole by phosphorus compounds in detecting the presence of toxic air contaminants. A kinetic study of the polymerization of N-vinylcarbazole at 25C in methylene chloride with diethylphosphoric acid and diethylchlorophosphate was begun. The results indicate that the hydrolysis of diethylchlorophosphate is very rapid, does not influence the rate of polymerization, and is essentially complete to yield two catalytically active acids. Neither catalyst or water are consumed in the polymerization. The sensitivity of the system was determined; 0.04 micrograms of diethylchlorophosphate produces a visually detectable turbidity due to polymerization of N-vinylcarbazole in acetonitrile within 14 mins. A search for less volatile polar solvent media for the polymerization of N-vinylcarbazole was begun.

AD-602 885 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

Peninsular ChemResearch, Inc., Gainesville, Fla.
SYNTHESIS AND POLYMERIZATION OF FLUORINATED SULFUR MODIFIED NITROSO RUBBER.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by Eugene C. Stump and Calvin D. Padgett.
21 Jan 64, 30p
Contract DA19 129AMC157N

Unclassified report

Descriptors: (*Synthetic rubber, Synthesis (Chemistry)), (*Organic nitrogen compounds, Polymerization), Organic sulfur compounds, Fluorination, Halogenated halocarbons, Fluorides, Copolymerization, Ethers, Ketones, Radiation chemistry, Ultraviolet radiation, Spectra (Infrared).

Efforts to prepare CF3SNO and SF5NO continued (see AD-437 996). The new monomer CF3SCF=CF2 was prepared and its reactivity with CF3NO and CF2=CF2 examined. An attempt to homopolymerize CF3SCF=CF2 using cobalt-60 irradiation gave a very low conversion. Ultraviolet irradiation of a mixture of CF3SCF=CF2 and ClNO in the gas phase gives a blue liquid, probably either CF3SCFClCF2NO or CF3SCF(NO)CF2Cl. Attempts to obtain copolymers from both thiocarbonyl fluoride and perfluorothioacetone were not successful. The intermediate CF3SCl was prepared by an alternate synthesis involving the gas-phase irradiation of a mixture of CF3SSCF3 and chlorine. (Author)

AD-602 900 Div. 4, 7
OTS Prices: HC $1.00/MF $0.50

United Nuclear Corp., White Plains, N. Y.
ELECTROCHEMICAL DEVICE FOR OXYGEN REMOVAL.
Bimonthly status letter no. 4, 1 Jan-29 Feb 64,
by J. McKee. 16 Mar 64, 9p UNC MTL3722
Contract AF33 615 1039, Proj. 2199

Unclassified report

Descriptors: (*Liquid metals, Heat exchangers), (*Electrolytic cells, Heat transfer), Thorium compounds,

MECHANISM OF DIRECT ACTION OF RADIATION ON PERCHLORIC U.C. ACID,
by L. T. Bugaenko. 28 Jan 64, 12p
FTD MT63 194; TT 64 11971

Unclassified report

Edited machine trans. of mono. Vsesoyuznoe Soveshchanie po Radiatsionnoi Khimii (All-Union Conference on Radiation Chemistry) (no. 2) Moscow [1960] . Trudy, Moscow, 1962, p. 144-148.

Descriptors: (*Radiation chemistry, Perchloric acid), (*Perchloric acid, Radiation chemistry), Perchlorates, Perchloryl radicals, Reduction (Chemistry), X-rays, Ions, Iron, Ethanols, Acetones, Reaction kinetics, USSR.

Results are given of studies on the effects of bivalent Fe, ethanol, and acetone on the reduction of perchlorate ions in the presence of X-radiation.

AD-602 652 Div. 4
OTS Prices: HC $1.00/MF $0.50

Davies (Edward) Chemical Lab., Univ. Coll of Wales, Aberystwyth.
MOLECULAR PARAMETERS AND BOND STRUCTURE. PART 2. CARBON-HYDROGEN BONDS IN CH3X AND CH2XY MOLECULES.
Scientific rept. no. 8,
by R. G. Jones, J. A. Ladd, and W. J. Orville-Thomas.
c9 Apr 64, 24p
Contract AF61 052 691
AFCRL 64 486

Unclassified report

Descriptors: (*Chemical bonds, Vibration), Carbon Hydrogen, Methyl radicals, Spectra (Infrared), Halocarbons, Aldehydes, Alcohols, Nitriles, Carboxylic acids, Atomic orbitals, Ions, Polarization, Great Britain.

Carbon-hydrogen bond-stretching vibrations do not interact appreciable with other modes. Hence their frequencies give information on bond structure. It is shown, theoretically, that there appear to be an infinite number of possible electronic structures for a bond of definite strength. (Author)

AD-602 673 Div. 4
OTS Prices: HC $3.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
THE ELECTRONIC STRUCTURE OF B10H12I2,
by Emmett B. Moore, Jr. Mar 64, 51p, D1 82 0352

Unclassified report

Also available from the author.

Descriptors: (*Decaboranes, Molecular structure), (*Iodine compounds, Decaboranes), Boranes, Iodides, Atomic orbitals, Electron transitions, Polarization, Ionization potential, Dipole moments, Field theory.

Several molecular orbital calculations were carried out for B10H12I2. The first two allowed electronic transitions are found to be polarized perpendicular to the twofold axis of the molecule, which is in agreement with experiment. The ionization energy is predicted to be 0.5 to 1.0 eV less than the ionization energy of B10H14 and the dipole moment is predicted to be 0.5 to 1.0 D greater than the dipole moment of B10H14. The charge distribution is predicted to be the same as in B10H14 with the exception of boron atoms 2 and 4 from which negative charge is abstracted by the iodine atoms. (Author)

AD-602 701 Div. 4, 7
OTS Prices: HC $5.00/MF $1.00

California Univ., Berkeley.
PHENOMENA AT A GAS-ELECTRODE-ELECTROLYTE INTERFACE.
Technical rept. no. 3,
by Douglas Noel Bennion. 1 Jun 64, 159p
Contract DA36 039sc89153

Unclassified report

Rept. on Transport Processes in Electrode Systems.

Descriptors: (*Fuel cells, Chemical reactions), (*Electrochemistry, Fuel cells), Gases, Oxygen, Electrodes, Nickel, Silver, Electrolytes, Potassium compounds, Hydroxides, Oxidation-reduction reactions, Electric currents, Distribution, Reaction kinetics, Mathematical models.

Many of the reactants proposed for use in fuel cells are gases. These undergo oxidation or reduction involving charge transfer on the solid surface of a porous matrix in the presence of an electrolytic solution. The purpose of the investigation was to determine where the reaction takes place spacially and what factors control the distribution and rate of the reaction. The variation of current density distribution along a plane, partially immersed electrode relative to the apparent meniscus was measured as a function of total applied current. Measurements are reported for the cathodic current density distribution of O2 gas and aqueous KOH electrolyte on sectioned Ni and Ag electrodes. These measurements show that the current extends well above the apparent meniscus into a thin electrolyte film on the surface of the electrode. The behavior of this system can be predicted by a mathematical model. (Author)

AD-602 794 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

Aerospace Research Center, General Precision, Inc., Little Falls, N. J.
HIGH TEMPERATURE RESISTANT POLYMERS.
Quarterly progress rept. no. 2, 1 Apr-30 Jun 64,
by C. Vogel. 15 Jul 64, 26p
Contract NObs90194, Proj. SR007 04 01, Task 1050

Unclassified report

Descriptors: (*Heat-resistant plastics, Phthalocyanines), (*Phthalocyanines, Polymerization), (*Aluminum compounds, Heat-resistant plastics), (*Silicon compounds, Heat-resistant plastics), Metalorganic compounds, Polymers, Chlorides, Synthesis (Chemistry), Cyclooctane derivatives, Grignard reagents, Siloxanes, Nitriles, Stability, Spectra (Infrared).

Chloraluminum phthalocyanine was prepared and treated with a number of different basic reagents. These included aniline, pyridine, thiourea, DABCO and phenyl magnesium bromide. Stable reaction products were isolated only with the latter two reagents. The reaction of o-phthalonitrile with hexachlorodisiloxane in quinoline did not lead to PcSiCl2 as reported by Kenney, but gave instead what appears to be Cl-PcSi-O-PcSi-Cl. This compound did not hydrolyze in concentrated sulfuric acid. PcSi(OH)2 when treated with n-C18H37OH in refluxing tetralin followed by contact with ethanol yielded PcSi(OC2H5)2. (Author)

AD-602 798 Div. 4
OTS Prices: HC $1.00/MF $0.50

Georgia Univ., Athens.
CHEMICAL AND ENZYMATIC STUDIES ON THE CONVERSION OF CHEMICAL ENERGY TO LIGHT.

5. Communications

AD-602 436 Div. 5, 8, 12
OTS Prices: HC $5.00/MF $1.00

Bell Telephone Labs., Inc., Whippany, N. J.
DISTRIBUTED SATELLITE CIRCUMGLOBAL COMMUNICATION TECHNIQUE STUDY, VOLUME I.
Final rept., vol. 1,
by R. E. Graham, I. Jacobs, T. T. Kadota, H. Morrison, and A. D. Whalen. May 64, 178p
Contract AF30 602 2668, Proj. 4519, Task 3451901
RADC TDR64 187 V1

Unclassified report

Descriptors: (*Global communication systems, Communication satellites (Passive)), (*Communication satellites (Passive), Multipath transmission), Electromagnetic waves, Scattering, Radio signals, Modulation, Detection, Errors, Corrections, Coding, Doppler effect, Multipath transmission, Space communication systems, Costs, Performance (Engineering).

The purpose of this investigation is to provide an initial evaluation of techniques applicable to a global communications network utilizing orbiting dipoles as a scattering medium. Emphasis has been placed on those techniques which are peculiar to the propagation medium employed. Consideration of the scattering mechanism led to development of a quaternary modulation technique. An analysis has been made of the performance of various error correcting and error detecting codes which can be used in conjunction with a one of five modulation system. The doppler spread was calculated very accurately as a function of the orbital parameters and station geometry. Transmission calculations were made and performance of the system compared to that of a discrete passive satellite system. (Author)

AD-602 448 Div. 5, 1, 19
OTS Prices: HC $6.00/MF $1.25

Airborne Instruments Labs., Inc., Deer Park, N. Y.
PERFORMANCE AND REQUIREMENT ANALYSIS OF VIDEO DECODERS FOR USE WITH ATC RADAR BEACON SYSTEM.
Final rept.
by Allan Ashley and Lanier G. Cole. Jan 63, 249p
AIL 8893 2
Contract FAA BRD329, Proj. 8893 2, Task 2
N63 23518

Unclassified report

Descriptors: (*Video signals, Decoding), (*Decoding, Video signals), (*Radar beacons, Air traffic control systems), (*Air traffic control systems, Radar beacons), Communication theory, Television display systems, Performance (Engineering), Systems engineering, Probability, Decision theory, Real time, Multiplex, Plan position indicators.

This report presents the results of a study of the performance and requirements for decoders in the ATC Radar Beacon System. Many related topics are also presented. The study, essentially analytical, views the decoder from a functional standpoint in the performance of the overall system rather than as a piece of hardware. An extensive list of conclusions and recommendations is presented as a guide for system and component design in order that a continuously improving system may evolve. (Author)

AD-602 455 Div. 5, 6, 8
OTS Prices: HC $1.00/MF $0.50

Mitre Corp., Bedford, Mass.
RF POWER ALLOCATION FOR A UNIFIED TELEMETRY SYSTEM,
by L. L. Stine. Jun 64, 20p Mitre W-06827
Contract AF19 628 2390, Proj. 705 2
ESD TDR64 104

Unclassified report

Descriptors: (*Telemeter systems, Radiofrequency power), (*Radiofrequency power, Telemeter systems), Power supplies, Optimization, Frequency, Multiplex, Signals, Phase modulation.

The document describes the power spectrum of a RF carrier phase modulated by several frequency-multiplexed signals. It is proved, in text and in illustration, that an improvement in power allocation is possible by modulating one signal on a separate RF carrier. (Author)

AD-602 484 Div. 5, 8, 12
OTS Prices: HC $3.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROBABILITY DISTRIBUTION OF ANTENNA GAIN FOR SATELLITE WITH SWITCHED ANTENNA SYSTEM,
by R. N. Assaly. 4 Feb 64, 56p LL TR-347
Contract AF19 628 500
ESD TDR64 28

Unclassified report

Descriptors: (*Communication satellites (Active), Satellite antennas), (*Satellite antennas, Gain), Antennas, Switching circuits, Optimization, Probability, Statistical distributions, Antenna radiation patterns, Geometry, Programming (Computers).

For a communication system using satellites carrying antennas tied to a switching system, the probability distribution of angles between the pointing directions of the axis of the operating antenna and of a ground receiving station is found. This study is based on the condition that the antenna pointing most nearly in the direction of a sensing signal is switched on. In the determination of the characteristics of this system, geometries of pointing directions are found, which are optimum or near optimum, for the cases of 4, 6, 8, 12, 16, 24, 32, 48, and 60 antennas. Consideration is also given to determining an optimum antenna pattern to be used with any geometry. For any pattern, a conversion from probability distribution of angles to probability distribution of gains is straightforward. The results of this study are summarized in a chart. (Author)

AD-602 688 Div. 5, 12
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE UNIVERSE ON A PICTURE SCREEN,
8 Jul 64, 4p
FTD TT64 78; TT 64 71120

Unclassified report

Unedited rough draft trans. from Berliner Zeitung (East Germany) 1963, 5 Apr, p. 5.

Descriptors: (*Television equipment, Space probes), (*Planets, Photography), Moon, Lunar probes.

Zirconium compounds, Calcium compounds, Yttrium compounds, Oxides, Oxygen, Seals, Sodium compounds, Electrolysis, Granite, Electric currents, Conductivity, Resistance (Electrical), Tests, Corrosion inhibitions.

The first thoria-yttria cell tested in sodium cracked at 140 hr. Its current efficiency and current density were low, but it apparently did remove some oxygen from sodium. The second such test encountered rising cell resistance, a new development. The rise is tentatively ascribed to depletion of oxygen from a stagnant sodium layer around the cell. Electrolysis of a zirconia-calcia cell in sodium was interrupted by overheating of the O-ring seal. A revised seal using forced air cooling, eliminated this problem. A zirconia-yttria cell electrolyzed in oxygen showed encouragingly high conductivity and current efficiency at 1000F. It also showed current efficiency increasing with current density up to a maximum before decreasing. This unexpected behavior has not been explained. Electrolysis of zirconia-calcia plates in oxygen indicated that this material will not be as useful as zirconia-yttria at temperatures below 1400F. (Author)

AD-602 927 Div. 4, 25
OTS Prices: HC $2.00/MF $0.50

Illinois Univ., Urbana.
SPIN-ECHO NMR STUDIES OF CHEMICAL EXCHANGE. I. SOME GENERAL ASPECTS.
Technical rept. no. 71,
by Adam Allerhand and H. S. Gutowsky. 29 Apr 64, 41p
Contract Nonr1834 13, Proj. NRO51 215
Unclassified report

Descriptors: (*Exchange reactions, Nuclear magnetic resonance), Amides, Chlorides, Absorption spectrum, Frequency, Heat of activation, Relaxation time, Waveform generators, Pulse generators.

A method is described for calculating the exchange rate from the observed dependence upon the RF pulse separation of the apparent decay constant. The method was applied to the hindered internal rotation of N,N-dimethyltrichloroacetamide and dimethylcarbamyl chloride as a function of temperature. The resultant activation energies of 14.6 and 14.0 kcal/mole and frequency factors of 3.5 x 10 to the 12th power and 7.1 x 10 to the 10th power, respectively, are appreciably higher than previously reported values. Comparative determinations were carried out using the high resolution NMR methods. The relatively large differences in the results from the various methods and from different laboratories indicate that systematic errors are present, several possibilities for which are discussed. A simple arrangement is described for generating the Carr-Purcell pulse sequence with three waveform generators and two pulse generators.

AD-602 956 Div. 4, 7, 25
OTS Prices: HC $6.00/MF $1.25

Pennsylvania State Univ., University Park. Mineral Industries Experiment Station.
THE KINETICS OF A REDOX REACTION AT SOLID AND POROUS ELECTRODES.
Rept. no 6,
by Harry Lerner. May 64, 229p
Contract DA49 186 502ORD917
Unclassified report

Doctoral thesis.

Descriptors: (*Oxidation-reduction reactions, Reaction kinetics), (*Reaction kinetics, Oxidation-reduction reactions), (*Electrochemistry, Fuel cells), (*Electrodes, Carbon), Solids, Porous materials, Diffusion, Tin compounds, Chlorides.

This report presents the results of an experimental study that was directed towards verifying the theory of polarization for a porous diffusion electrode system. In addition, all of the theory and recent literature which is relevant to the problem is presented in considerable detail. The two most significant findings of the study, which utilized the SnCl2, SnCl4 redox couple at solid and porous electrodes of carbon, are: 1) As predicted by the theory, there is a doubling of the normal Tafel slope for the porous electrode systems. 2) The calculated and experimental Tafel intercepts for the porous electrode systems are in good agreement. The conclusion of this study is that it has been shown in a clear and unambiguous manner that the proposed theory for the porous diffusion electrode system is correct. This has significance from a fundamental point of view since it confirms, for the first time, the proposed physical picture of this type of system. It also has practical implications in the field of fuel cells and related energy conversion devices where such systems are often used but not well understood. In particular, it justifies the extension of the concepts used to the more complex gas diffusion type of electrode system. (Author)

Contract AF30 602 3010, Proj. 5597, Task 559702
RADC TDR64 137

Unclassified report

Descriptors: (*Display systems, Electrochemistry), (*Photoelectric materials, Display systems), Photoconductivity, Deposits, Cadmium compounds, Sulfides, Selenides, Electrodeposition, Electrochemical cells.

The basic technique employs photoconductor phenomena in conjunction with electrochemical deposition action. A light image from a cathode ray tube or other source is directed on a photoconductor layer at the rear of a reversible electrochemical layer. The changes in conductivity in the photoconductor layer provide the means for exceeding the deposition potential of the affected parts of the electrochemical layer, thus producing the original light image in the form of electrochemical deposits. The result is a display viewed in reflected ambient light. (Author)

AD-602 845 Div. 5
OTS Prices: HC $3.00/MF $0.50

RCA Defense Electronic Products, New York.
STUDY AND APPLICATION OF ADAPTIVE COMMUNICATION TECHNIQUES IN THE DEFENSE COMMUNICATION SYSTEM.
Interim rept. no. 1, 5 Mar-5 Jul 64.
5 Jul 64, 53p CR64 419 7
Contract DCA6, Proj. 40500AR, Task 40502AR

Unclassified report

Rept. on System Adaptive Techniques.

Descriptors: (*Adaptive communication systems, Data transmission systems), (*Underwater communication systems, Passive defense), (*Data transmission systems, Digital systems), Communication systems, Multiplex, Errors, Communication theory, High frequency, Coaxial cables, Submarines.

This is a first report on a study of adaptive techniques for use in submarine cable, HF, and land-line digital links of the DCS for the period 1970-1975. The overall objective is to devise adaptive data systems which maintain a desired quality of transmission in terms of bit-error-rate under variable conditions of transmission at given, fixed input bit-rates. Of particular concern are input data rates of 2.4 kb in channels of 3 to 4 kc width, and 38.4 kb in a 48 kc channel with a nominal goal of 0.000001 bit-error-rate over a 12,000 n.m. circuit. The study is directed to adaptive control of the data channel in distinction to control of the data source. It is desired that the channel be transparent to the user of the system in the sense that data can be applied and received continuously at the given, fixed bit-rate. In essence, adaptive modems are being sought, - this is to say data modems augmented by channel monitoring and control sub-systems which regulate the mode of transmission and means of detection. This report covers the study of the submarine cable and related work.

AD-602 955 Div. 5, 30
OTS Prices: HC $4.00/MF $0.75

RCA Defense Electronic Products, Camden, N. J.
VOCODER EVALUATION RESEARCH.
Final rept.,
by W. F. Meeker and A. L. Nelson.
29 Feb 64, 112p CR64 558 1
Contract AF19 604 8507, Proj. 4610, Task 461002
AFCRL 64 453

Unclassified report

Descriptors: (*Speech transmission, Digital systems), (*Speech compression, Coding), Voice communication systems, Recording systems, Language, Speech representation, Statistical tests, Preamplifiers, Microphones.

In support of research in digital speech transmission and speech bandwidth compression, several related tasks were completed. Master tape recordings of speech from 38 male and 19 female talkers were provided using microphones, preamplifiers, and equalizers duplicating those used for speech recordings. Material recorded by each talker consisted of 20 minutes of continuous speech, a regional dialect check list, a nonsense syllable list, and 6 PB word lists. Articulation tests were conducted to evaluate several vocoder configurations and data rates for two experimental vocoders. An analysis was made of phonetic errors for one vocoder configuration. Preliminary work was done toward vocoder evaluation by computer. (Author)

AD-602 973 Div. 5
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 6. SPACE COMMUNICATIONS.
Quarterly progress rept. no. 4, 1 Mar-31 May 64,
15 Jun 64, 31p
Contract AF19 628 500
ESD TDR64 336

Unclassified report

Descriptors: (*Space communication systems, Design), Communication satellites (Active), Communication satellites (Passive), Satellite antennas, Telemetering antennas, Tracking, Space surveillance systems, Radar reflectors, Radar station, Programming (Computers), Speech transmission, Space probes, Propagation, Communication theory, Radio receivers.

Progress in the following areas is summarized: switched-beam antenna system for satellite communication; telemetry antennas; West Ford tracking system; Lincoln Experimental Terminal (LET); horn reflector antenna and gain standard for the Haystack Hill radar site; Millstone Hill radar; speech processing; active Satellites (Environmental Studies); Lincoln Experimental Satellite (LES); Space Probe Instrumentation; propagation measurements; multiple access studies; West Ford studies; Communications Theory; Low-Noise Receivers for space communications.

AD-602 712 Div. 5, 8
OTS Prices: HC $3.00/MF $0.50

Laboratory for Electroscience Research, New York, Univ., N. Y.
DESIGN OF BANDLIMITED SIGNALS FOR BINARY COMMUNICATION USING SIMPLE CORRELATION DETECTION.
Scientific rept. no. 16,
by Burton R. Saltzberg and Ludwik Kurz. Feb 64, 52p NYU TR400 90
Contract AF19 604 6168, Proj. 4610, Task 461003
AFCRL 64 289

Unclassified report

Descriptors: (*Communication theory, Data transmission systems), (*Signals, Correlators), Design, Bandwidth, Wave transmission, Wave functions, Signal-to-noise ratio, Feedback, Communication systems, Interference, Errors, Probability, Calculus of variations.

This paper considers the design of binary signals for transmission over a channel with additive white Gaussian noise and to be received by a memoryless correlation detector. The requirements of partial and total bandwidth limitations are considered. The signal is chosen so as to minimize the probability of error due to the combined effects of the noise and intersymbol interference. The resultant signals for both types of bandwidth limitation are expressed in terms of prolate spheroidal wave functions. The method of signal design presented can be used successfully to improve the performance of feedback communication links. (Author)

AD-602 807 Div. 5
OTS Prices: HC $2.00/MF $0.50

International Electric Corp., Paramus, N. J.
TEST REPORT FOR CATEGORY II ON-SITE INTERGRATION TESTS OF THE ELECTRONIC DATA TRANSMISSION COMMUNICATIONS CENTRAL AN/FYQ-5 AND THE DATA PROCESSING CENTRAL AN/FSQ-31.
Jan 64, 33p, IEC TR 50100-1
Contract AF19 626 8
ESD TDR64 181

Unclassified report

Descriptors: (*Strategic Air Command, Communication systems), (*Communication systems, Strategic Air Command), Performance (Engineering), Military requirements, Communication theory, Data transmission systems, Data processing systems, Correlators, Tests, Integrators.

This report describes the debugging, dry run, and formal test activities associated with the Category II, Part I integration of the SAC 465L System Electronic Data Transmission Communication Central with the Data Processing Central conducted at SAC Headquaters. Demonstration testing was performed for the witnessing USAF Test Team. The test modifications proposed at the Pre-test Briefing were approved for use by the USAF Test Team. The 'Preliminary Procedures' portion of the Test Specification were witnessed by the USAF Test Team in advance of cable connection, equipment debugging and dry run activities. Overall conduct of the test and the individual test results were satisfactory, although the following discrepancies were noted on the DD Form 250 prepared to document this testing. (a) An out-of-tolerance waveform occurs which has been determined to be the result of system design. (b) A voltage polarity indication was omitted from the wording of the performance and design specifications. (Author)

AD-602 808 Div. 5, 8
OTS Prices: HC $7.00/MF $1.75

National Cash Register Co., Dayton, Ohio.
HIGH FREQUENCY DIGITAL COMMUNICATION SYSTEM: AN/GRC(XW-3) AND CV-1355(XA-1)/ARC.
Final engineering rept. for Mar 60-Mar 64,
19 Jun 64, 358p NCR 3F
Contract AF33 600 42197
SEG TDR64 26

Unclassified report

Descriptors: (*Radio communication systems, Digital systems), High frequency, Air-to-surface, Communication systems, Frequency modulation, Multipath transmission systems, Transmitter-receivers, Electronic circuits, Aircraft equipment, Ground support equipment, Design, Operation.

The High Frequency Digital Communication Systems consists of an airborne digital-to-digital converter and the ground station receiving and transmitting equipment. Briefly, the digital-to-digital converter accepts standard Fieldata code at 50 bits per second and converts the 20 millisecond marks and spaces into a series of 6-2/3 millisecond cos to the 2nd power shaped intermediate frequency pulses. These IF pulses, which are 50% overlapped and linearly summed from six IF subcarriers, are sent to the transceiver equipment for transmission on a 3 kilocycle bandwidth channel. During reception, the transceiver delivers the 6-2/3 millisecond pulses, distorted by the propagation path, to the airborne converter, which separates the received signal into the six subchannels so that mark/space decisions can be made on the basis of the sequence of the pulses. The converter also provides relay switching of the necessary functions such as AGG, keyline, finish tune signal, etc., for compatibility and operation with modified AN/ARC-58 and AN/ARC-65 radio sets. (Author)

AD-602 809 Div. 5, 8
OTS Prices: HC $2.00/MF $0.50

Radiation, Inc., Melbourne, Fla.
REPEATER, TELEGRAPH TH-38( )/G.
Rept. no. 7 (Final),
by E. Dorsett. 30 Jun 64, 48p
Contract DA36 039sc87254

Unclassified report

Descriptors: (*Telegraph equipment, Design), Electric switches, Magnetic amplifiers, Transistors, Rectifiers, Power supplies, Transients, Reliability (Electronics), Containers, Vibration isolators, Construction, Tests.

The project consisted of the design, development, fabrication, and testing of twenty Telegraph Repeaters, Type TH-38 ( )/G and the generation of the required documentation. The Telegraph Repeater was designed to operate as a repeater or to convert standard telegraph signals from one form to another. A prime objective was to achieve a high degree of reliability under all service conditions.

AD-602 826 Div. 5, 4, 8
OTS Prices: HC $4.00/MF $1.00

Philco Research Labs., Newport Beach, Calif.
DYNAMIC LARGE SCREEN ELECTOCHEMICAL DISPLAY.
Final rept.
by G. Galli, W. D. Gerber, and M. H. White.
Jun 64, 138p

AD-602 971 Div. 6, 19
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
A STUDY OF NON-RANDOM RANGE, AZIMUTH, AND ELEVATION RESIDUALS INDUCED AT THE OBSERVATION SITE,
by T. P. Gabbard, Jr. Jun 64, 42p TOR269 4110 01 46
Contract AF04 695 269

Unclassified report

Descriptors: (*Tracking, Errors), Position finding, Ranges (Distance), Azimuth, Satellites (Artificial), Equations, Vector analysis, Graphics.

The station-induced non-random errors in range, azimuth, and elevation which contribute to their residuals are of two types. The first are those associated with the equipment wherein the only non-random error here appears as a bias term. For example, in the case of range, this bias may be due to a poor range 'zero' calibration. However, this analysis is not primarily concerned with these equipment errors, but rather with the second group of errors, which are associated with the misidentification of the origin and orientation of the reference frame. (Author)

6. Detection

AD-602 507 Div. 6, 2, 30
OTS Prices: HC $2.00/MF $0.50

Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
NOISE LEVELS OBSERVED WITH SHIP-TOWED GEOPHYSICAL HYDROPHONE ARRAYS.
Technical rept. no. 112,
by J. A. Smith and E. T. O'Neill. 1 Apr 64, 31p
CU 137 640NR266Phys
Contract Nonr266 84

Unclassified report

Descriptors: (*Hydrophones, Signal-to-noise ratio), (*Acoustic properties, Towed bodies), Underwater sound, Measurement, Acoustic ranges, Underwater sound equipment, Acoustic detectors, Seismic waves, Ship noise.

The measurements of noise levels which were observed with several types of hydrophones and hydrophone array assemblies are compared with the ambient sea noise at the time of measurement. The flow noise for single hydrophones was too high to make comparisons of the different methods of construction. Hydrophone array noise levels were from one-fifth to one-half the ambient level. In the array tests, hydrophones that were acceleration balanced and compliantly mounted within a cylinder had noise levels about one-fourth of the noise levels observed with other types of construction in the 100 to 400 cycle range. (Author)

AD-602 751 Div. 6, 5, 12
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CROSS-SECTION MEASUREMENTS OF THE ECHO II SATELLITE BY THE MILLSTONE L-BAND RADAR.
Group rept.
by R. F. Julian and D. P. Hynek. 7 Apr 64, 16p
LL 196416
Contract AF19 628 500
ESD TDR64 43

Unclassified report

Descriptors: (*Communication satellites (Passive), Radar tracking), (*Satellites (Artificial), Radar tracking), Radar reflections, L-band, Balloons, Doppler effect, Space surveillance systems.

The report is a summary of the Millstone Radar tracking activities during the early revolutions of Echo II. Eight revolutions were tracked and cross-section measurements taken during the satellite's first four days in orbit followed by four additional tracks during the next three weeks. All cross-section measurements beginning with Rev. 4, the first observable at Millstone, display a fading pattern indicating that the balloon had not attained full sphericity, or at least contained significant surface irregularities. No essential change in the fading pattern was noted throughout the period that measurements were taken, except for perhaps more frequent fading during the later passes. Starting with Rev. 5, the first complete horizon-to-horizon measurement made, a periodicity of approximately 104 seconds was observed. This periodicity was also apparent during the later passes. The estimated average radar cross section during these observations was about one-half the theoretical 1330 square meters. A pulse-to-pulse cross section vs time record is included for Rev. 5 and Rev. 321. (Author)

AD-602 799 Div. 6, 12
OTS Prices: HC $6.00/MF $1.25

Brown (D.) Associates, Inc., Eau Gallie, Fla.
INVESTIGATION OF THE FEASIBILITY OF SELF-CALIBRATION OF TRACKING SYSTEMS.
Final rept.
by Duane C. Brown, Norman Bush, and Jerome Sibol.
29 May 64, 249p
Contract AF19 628 3286, Proj. 5930, Task 593003
AFCRL 64 441

Unclassified report

Descriptors: (*Tracking, Calibration), (*Calibration, Feasibility studies), Errors, Models (Simulations), Model theory, Orbital trajectories, Statistical analysis, Numerical analysis, Simulation, Compilers, Least squares method, Geodesics, Range finding, Satellites (Artificial), Radar tracking, Optical tracking, Equations, Motion, Calculus of variations, Matrix algebra, S-matrix, Mathematical models.

The Error Model Best Estimate of Trajectory (EMBET) is derived for a tracking system measuring any linear combination of ranges and range rates. Provisions are made for the introduction of any functional statistical constraints on the coefficients of the error model. Provisions are also made for the introduction of dynamic constraints expressed either in terms of explicit functions or in terms of general differential equations of motion. A rigorous extension of EMBET to apply to a hierarchy of orbits (rather than individual trajectory points) is developed. It provides an altogether practical solution to the long standing problem of the simultaneous adjustment of all observations made by all sensors on an unlimited number of orbits or epochal intervals. This extension, called NEO-EMBET (N-Epoch Orbital EMBET), also calibrates both stable and unstable components of the error models of all observational channels while simultaneously estimating the orbital parameters at all specified epochs as well as any gravitational and drag parameters considered to be unknown.

AD-602 812 Div. 6, 25
OTS Prices: HC $2.00/MF $0.50

Upper Air Research Labs., Univ. of Utah, Salt Lake City.
AEROSPACE VEHICLE DETECTION STUDIES.
Technical documentary rept. for 1 Mar-31 May 64,
by William L. Jones, Wayne K. Barlow, and Alvin M. Despain. 18 Jun 64, 40p
Contract AF04 695 339

Unclassified report

Prepared in cooperation with Electro-Dynamics Labs., Utah State Univ., Logan, Utah.,

Descriptors: (*Spectrum analyzers, Detectors), (*Detection, Aerospace craft), (*Aerospace craft, Detection), (*Interferometers, Detectors), Optical scanning, Narrowband, Sensitivity, Signal-to-noise ratio, Ions, Ionic current, Luminescence, Diffraction gratings, Electron density, Oxygen, Ionization potentials, Light transmission, Reflection, Absorption, Coatings, Satellites (Artificial), Surfaces.

Contents: Sensitivity of a Scanning Fabry-Perot Interferometer; Field Spectrograph; and Satellite Induced O(+) Recombination Coefficient Calculation.

AD-602 395 Div. 7
OTS Prices: HC $2.00/MF $0.50

Melpar, Inc., Falls Church, Va.
A THIN-PLATE BATTERY. SUPPLEMENT TO MOLECULAR CIRCUIT DEVELOPMENT.
Quarterly rept. no. 1, suppl. for 12 Mar-12 Jun 64, by J. Smit, H. H. Titus, and R. T. Foley. 12 Jun 64, 31p
Contract NOw64 0568d

Unclassified report

Descriptors: (*Batteries and components, Primary cells), Voltage, Low temperature research, Pressure, Data, Feasibility studies, Carbon, Ammonia, Magnesium, Stainless steel, Electrolytic cells, Organic compounds, Electrodes, Electrolytes, Electric power production, Molecular electronics, Circuits.

The purpose of the program is to determine the feasibility of producing a practical high-power output, reserve, primary battery based on a liquid-activated ammonia system. Activity during the reporting period concerned principally the evaluation of multicell battery performance and the design of a 150-watt self-contained battery unit. The effect on multiple-cell performance of various battery parameters was ascertained primarily through a fractional factorial series of experiments. The factors analyzed in this series concerned details of cell fabrication and battery construction. The units of this series were evaluated for the most part on the basis of output voltage. In addition to the factorial series, several low-temperature, exploratory experiments were carried out on two different sizes of multicell units. These units were activated at temperatures below -54C. (Author)

AD-602 513 Div. 7, 22
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
PRESSURE TRANSDUCER FOR MEASURING SHOCK WAVE PROFILES: ADDITIONAL GAGE DEVELOPMENT.
Progress rept. nos. 34 and 3, 1-30 Jun 64, by D. D. Keough and R. F. Williams 7 Jul 64, 7p
Contracts DA49 146XZ096 and DA49 146XZ280, Projs. GPU3713 and GPU4832

Unclassified report

Descriptors: (*Shock waves, Measurement), (*Piezoelectric transducers, Design), Silicon, Oxides, Wire, Equations, Electrical impedance, Resistance (Electrical), Electric insulation, Hysteresis, Epoxy plastics, Pressure gages, Piezoelectric gages.

AD-602 582 Div. 7, 8, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTOMETRIC AMPLIFIER,
by B. I. Zarkhin, M. A. Pushkin, and M. E. Slutskii.
5 May 64, 15p
FTD MT64 09, TT 64 11953

Unclassified report

Edited machine trans. of Pribory i Tekhnika Eksperimenta (USSR) 1963 [v. 8] no. 4, p. 90-94.

Descriptors: (*Amplifiers, Electrometers), (*Electrometers, Amplifiers), Measuring devices (Electrical and Electronic), Direct current, Voltage amplifiers, Pentodes, Electron tube heaters, Cascade structures, Semiconductor devices, Electron tubes, Design, Operation, USSR.

There is described an electometric amplifier for the measurement of direct current in range 10 to the minus 11th power to 10 to the minus 15th power amperes. The amplifier uses an I-1 straight-filament electometric pentode of rod construction, working in circuit with the control of the first grid. The amplifier is noted for a large voltage amplification factor of the electrometric cascade, simplicity of circuit, construction, economy, small demensions and weight. In the circuit of the amplifier are used semiconductor devices. One of the basic parameters of the electrometric amplifier is the magnitude of the current of the control grid of the first cascade. For the purpose of lowering this current the electometric cascade usually works at low anode voltage, and a measured signal passes onto the second or third grid of the tube. Under such conditions, because of the low transconductance of the tube, the voltage amplification factor of the cascade does not exceed 1 to 2. (Author)

AD-602 635 Div. 7, 8
OTS Prices: HC $4.00/MF $1.00

Honeywell, Inc., Hopkins, Minn.
LOW INPUT VOLTAGE CONVERSION.
Final progress rept. for 1 Jul 62-29 Feb 64, by John T. Lingle and Sheldon D. Heaner.
29 Feb 64, 129p MH 68447
Contract DA36 039SC90808, Proj. 1G6 22001A053

Unclassified report

Descriptors: (*Voltage regulators, Design), (*Fuel cells, Energy conversion), Power supplies, Direct current, Alternating current, Rectifiers, Tunnel diodes, Magnetohydrodynamics, Thermionic converters, Thermoelectricity, Batteries and components, Generators, Solar cells, Performance (Engineering), Electronic equipment.

The advent of new power sources such as the fuel cell, thermionic diode, and thermoelectric generator has provided the stimulus for the investigation of low input voltage conversion. Since the voltage output of a single energy conversion cell is too low for most applications, it must be stepped up by either adding cells in series or by a converter. Series connection of some direct conversion sources is difficult, increases cost, reduces reliability, and may require monitoring and parameter control of each cell. The use of a single, large capacity power source cell or a minimum number of series connected source cells coupled to a converter, is considered a tentative and attractive solution to this problem. The initial effort under this contract was specifically directed toward the investigation of all known approaches to determine the optimum and presently most feasible approach to convert the low source voltage of fuel cells, thermionic diodes, thermoelectric generators, solar cells, and single-cell batteries to more usable higher voltages. (Author)

AD-602 676 Div. 7
OTS Prices: HC $8.42/MF $2.50

Inland Testing Labs., Dayton, Ohio.
ALKALINE BATTERY EVALUATION.
Final rept. for 30 Jun 60-15 Mar 64, by W. W. Clark, W. G. Ingling, I. F. Luke, and E. A. Roeger, Jr. Jun 64, 542p
Contract AF33 616 7529, Proj. 8173, Task 817304
APL TDR64 76

Unclassified report

Supersedes RTD TDR63 4144, P1; ASD TDR63 394, P1; AD-411 245; ASD TDR62 893 P1; AD-291 447; ASD TDR62 553; AD-278 647, ASD TDR62 68; AD-273 688; asd tr61 236; AD-276 051; N63-10422; N64-12325, N64-14962.

7. Electrical Equipment

AD-602 378 Div. 7
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
THE LEAD CALCIUM BATTERY. PART 4 . COMPARISON OF LEAD CALCIUM AND LEAD ANTIMONY CELLS IN FLOAT,
by Jeanne Burbank. 10 Jun 64, 12p
Proj. SF013 06 03, Tasks 4366 and RR001 01 43 4755
NRL 6078

Unclassified report

Descriptors: (Storage batteries, Performance (Engineering)), Lead compounds, Electrolytic cells, Polarization, Electrical properties, X-ray diffraction analysis, Electron microscopy, Crystallization, Lead alloys, Antimony alloys, Wet cells, Calcium alloys, Submarines, Environmental tests.

Four small portable lead acid cells were tested in a float cycle routine. Three of these cells had lead calcium alloy and one had lead antimony alloy in the positive grids. Cells with the lead calcium alloy positive grids failed early in the test accompanied by excessive softening of the positive active material. The presence of antimony in the positive grid caused depolarization of the positive plate in the floating cell, as well as the usual depolarization of the negative on overcharge. The active material of the antimonial cell remained firm for the duration of the tests. X-ray diffraction showed that the antimonial cell's positive plate contained more alpha PbO2 than the calcium cells, both before and after testing. Electron microscopic examination of the positive active material showed that the antimonial cell contained much prismatic material with many intricate clusters of complex crystals. The failed calcium cells showed only nondescript nodular PbO2 particles. The stability of the paste is believed to be related to the morphology of these particles. The presence of antimony in the positive grid caused the prismatic crystallization of the active material and promoted formation of alpha PbO2 because this was the only known difference in the two kinds of cell.

AD-602 381 Div. 7, 25
OTS Prices: HC $6.00/MF $1.25

International Research and Development Co., Ltd., Newcastle (England).
RESEARCH PROGRAMME ON MAGNETOPLASMA-DYNAMIC POWER GENERATION. PART 1: MPD CLOSED LOOP.
Technical summary rept. for 1 Dec 62-31 Mar 64,
by B. C. Lindley. 31 Mar 64, 256p IRD 64 36 p1
Contract N62558 3127

Unclassified report

Descriptors: (*Magnetohydrodynamics, Electric power production), (*Electric power production, Magnetohydrodynamics), Energy conversion, Fluid flow, Helium, Cesium, Purification, Refractory materials, Instrumentation, Vapors, Heat transfer, Graphite, Injection, Recovery, Tantalum, Space propulsion, Plasma physics, Great Britain, Heaters, Ducts, Microstructure, Corrosion.

High temperature commissioning of the closed-cycle helium-cesium MPD loop occupied about twelve months with a total of about 2000 hours of circuit operation, of which 300 hours were at temperatures up to 2500K with unseeded helium. The commissioning phase of the loop development program culminated on 19 March 1964 in cesium-seeded operation and electric power generation. In these initial experiments the loop was operated continuously for fifteen hours with indicated gas temperatures up to 2020K. Twenty series of measurements were made, with varying temperature, cesium content and applied magnetic field, extracting a maximum power output of 0.46 We from a five-electrode-pair constant-area generator. Electrical conductivities of about 0.5 mho/m were obtained at static gas temperatures below 1500K and there are reasons to expect a considerable improvement on this level. The main success is that the loop technology and operation was proved. (Author)

AD-602 382 Div. 7, 25
OTS Prices: HC $3.00/MF $0.75

International Research and Development Co., Ltd., Newcastle (England).
RESEARCH PROGRAMME ON MAGNETOPLASMA-DYNAMIC POWER GENERATION. PART 2: PLASMA PHYSICS.
Technical summary rept. for 1 Dec 62-31 Mar 64,
by B. C. Lindley. 31 Mar 64, 78p IRD 64 36 p2
Contract N62558 3127

Unclassified report

Descriptors: (*Electric power production, Magnetohydrodynamics), (*Magnetohydrodynamics, Electric power production), (*Plasma physics, Electric power production), Energy conversion, Microwaves, Gas ionization, Electrical conductance, Helium, Cesium, Phase shift, High-temperature research, Low-temperature research, Interferometers, Recombination reactions, Ionization potential, Photoelectric effect, Ultraviolet radiation, Electron bombardment, Transport properties, Vapors, Great Britain, Power supplies, Space propulsion, Electric propulsion.

Contents:
Microwave studies of thermally-excited plasmas, Atomic beam experiment, Microwave studies of photoionization and recombination, Electrical conductivity, Photoionization in MPD generators, Cross section measurements and transport properties in seeded inert gas MPD generators, and Electrical conductivity and breakdown in cesium vapour.

AD-602 383 Div. 7, 25
OTS Prices: HC $6.00/MF $1.25

International Research and Development Co., Ltd., Newcastle (England).
RESEARCH PROGRAMME ON MAGNETOPLASMA-DYNAMIC POWER GENERATION. PART 3: THEORETICAL.
Technical summary rept. for 1 Dec 62-31 Mar 64,
by B. C. Lindley. 31 Mar 64, 250p IRD 64 36
Contract N62558 3127, ARPA Order 209 62, Amend. 2

Unclassified report

Descriptors: (*Electric power production, Magnetohydrodynamics), (*Magnetohydrodynamics, Electric power production), Generators, Energy conversion, Plasma physics, Fluid mechanics, Electrons, Transport properties, Gas ionization, Electrical conductance, Nozzles, Spacecraft, Power supplies, Nuclear propulsion, Space propulsion, Electric propulsion, Optimization, Great Britain.

Contents:
Viscosity of MPD working fluids
Collision cross sections
Seed fraction optimization
Nozzle flow
Flow processes in MPD generators
The constant Mach number MPD generator
Optimization of large-scale nuclear MPD systems
Power conversion in space
A non-equilibrium electron mode for kilowatt-range MPD space power
Non-equilibrium plasmas.

8. Electronics and Electronic Equipment

AD-602 313 Div. 8, 2, 12
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE REFRACTION AND DOPPLER SHIFT OF RADIO-WAVES RADIATED BY ARTIFICIAL EARTH SATELLITES IN A THREE-DIMENSIONAL HETEROGENEOUS IONOSPHERE,
by Ya. L. Al'pert. 25 May 64, 20p
FTD TT64 384, TT 64 11848
Unclassified report

Unedited rough draft trans. of Geomagnetizm i Aeronomiya (USSR) 1963, v. 3, no. 4, p. 626-634.

Descriptors: (*Ionspheric propagation, Radio waves), (*Radio waves, Doppler effect), (*Satellites (Artificial), Ionospheric disturbances), Wave transmission, Propagation, Scattering, Electron density, Refraction, Refractive index, Mathematical analysis, Partial differential equations, USSR.

On the basis of the Fermat principle, using its analogy with the principle of least action, equations of the Lagrange-Euler type are written for the ionosphere and, from these, a generalized law for refraction in a three-dimensional - heterogeneous medium was formulated. Finally formulas were obtained for the refraction angles and the Doppler shift of radio waves radiated by a source located in the ionosphere. Here we examine a situation which is realizable with artificial earth satellite (AES) experiments, when the wave frequency is sufficiently great. For this case the Doppler shift depends linearly on: 1) the localized value of electron concentration in the vicinity of the emitter, 2) the refraction angles near the observation point in two planes which are mutually perpendicular relative to it and to the source, and 3) the average gradient values of the electron concentration along the trajectory of wave S. The corresponding analysis of the Doppler shift component caused by the influence of the ionosphere and measurable upon coherent radio waves radiation from AES makes it possible to determine all of these values. (Author)

AD-602 317 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech, Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE EFFECT OF MISMATCHES ON THE CHARACTERISTICS OF AN O-TYPE BACKWARD WAVE GENERATOR,
by L. V. Kasatkin and G. N. Rapoport. 25 May 64, 22p
FTD TT64 293; TT 64 11852
Unclassified report

Unedited rough draft trans. of Radiotekhnika i Elektronika (USSR) 1963, v. 8, no. 9, p. 1577-1586.

Descriptors: (*Microwave equipment, Backward wave tubes), (*Backward wave tubes, Performance (Engineering)), Generators, Perturbation theory, Oscillation, Linear systems, Nonlinear systems, Electron beams, Plasma oscillations, USSR.

By using the method of perturbations, analysis is made of the effect of small mismatches on the characteristics of a backward-wave generator in the linear and nonlinear regimes. (Author)

AD-602 321 Div. 8, 25
OTS Prices: HC $3.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
TWO-STREAM INSTABILITY IN A FINITE LENGTH,
by Richard Gerwin and Donald J. Nelson. Mar 64, 56p
D1 82 0332
Unclassified report

Also available from the authors.

Descriptors: (*Electron beams, Plasma medium), (*Plasma physics, Electron beams), Perturbation theory, Electric fields, Magnetic fields, Boundary value problems, Differential equations, Numerical analysis.

Two contra-streaming electron beams of equal densities and speeds interacting between two parallel planes are studied. The streams are cold and their average charge is compensated by a uniform positive background. For infinitely broad streams, an eigenfrequency equation is derived from the conditions that the entering beams be free of perturbations. The eigenfrequency equation is solved numerically and the results show there is no instability for omega sub b tau < pi/2(3/2), where omega sub b is the plasma frequency of either beam, and tau is half the transit time between the plates. For large values of omega sub b tau, the fastest-growing modes have a growth rate of omega sub b/2. The growth rate is also calculated from the dispersion relation assuming appropriate real values of wavenumber and is in good agreement with the exact results of the eigen-frequency equation. (Author)

AD-602 322 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle.
LIFETIMES OF NONEQUILIBRIUM CARRIERS IN MAGNETIC TRAPS,
by Betsy Ancker-Johnson and Michael F. Berg.
Apr 64, 14p D1 82 0340
Unclassified report

Also available from the authors.

Descriptors: (*Plasma physics, Magnetic fields), (*Magnetic fields, Plasma physics), Plasma medium, Configuration, Electrons, Indium alloys, Antimony alloys, Electric currents, Oscillation, Life expectancy, Measurement, Thermonuclear reactions.

Nonequilibrium electrons and holes in approximately equal density are produced in p-InSb at 77 K by forcing a current greater than ohmic through the sample. The density decays exponentially after an initial rapid decay occurring in < or equivalent to 200 nsec. The lifetime in the exponential region is 0.92 ± 0.05 microsecond in the nonequilibrium carrier density range 0.9 to 2.1 x 10 to the 13th power cm to the -3rd power when no magnetic fields are applied. The excess carrier density in the presence of a magnetic trap compared with that in its absence after a given decay time is observed to be enhanced by as much as 65%. The trap configuration used in these measurements is achieved by superposition of three static fields: (A) a uniform axial one, H sub a; (B) a symmetric non-uniform axial field emanating from two current coils located one each in the planes of the sample ends, H sub em, where em signifies 'end mirror'; (C) an axially symmetric transverse field in the form of a quadrupolar cusp, H sub wm, where wm signifies 'wall mirror'. (Author)

AD-602 333 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OBTAINMENT OF NANOSECOND PULSES OF ULTRA-HIGH FREQUENCY OSCILLATIONS,
by S. I. Andreev, V. M. Lebed', and B. M. Sokolov.
12 Jun 64, 6p
FTD TT64 472, TT 64 11859 Unclassified report

Descriptors: (*Batteries and components, Alkaline cells), (*Alkaline cells, Spacecraft), (*Storage batteries, Performance (Engineering)), Nickel, Cadmium, Silver, Zinc, Failure (Mechanics), Environmental tests, Temperature, Life expectancy, Tests, Electrolytic cells, Experimental data, Voltage, Electric currents.

This report includes the final results of cycle-life performance tests on 240 12 ampere-hour nickel-cadmium cells in groups of 10 cells and batteries of 20 cells, and 150 20 ampere-hour nickel-cadmium cells in groups of 10 cells. The 12 ampere-hour cells were cycled in four temperature environments with four depths of discharge in each environment while the 20 ampere-hour cells were cycled in five temperature environments with three depths of discharge in each environment. Also included in this report are the results of cycle-life performance tests conducted on 192 25 ampere-hour silver-zinc cells and 192 20 ampere-hour silver-cadmium cells separated into eight cell groups. Both types of cells were cycled in four temperature environments with three depths of discharge in each environment. The results obtained from the cycle-life performance tests on these four types of cells show that: (1) cell cycle-life with shallow discharges is considerably longer than cycle- life at deep discharges and (2) cycle-life is reduced by high and low ambient temperatures. (Author)

AD-602 699 Div. 7, 4, 14
OTS Prices: HC $2.00/MF $0.50

Columbian Carbon Co., Princeton, N. J.
CARBON BLACK FOR ORGANIC DEPOLARIZER BATTERIES.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 64, by M. T. Johnston and J. E. Smith. 31 Mar 64, 27p
Contract DA36 039AMC03239E, Proj. 1G6 22001A053
Unclassified report

Descriptors: (*Batteries and components, Carbon black), (*Carbon black, Manufacturing methods), Furnaces, Physical properties, Chemical properties, Experimental data, Life expectancy, Performance (Engineering), Fuel oil, Vanadium, Colloids.

Carbon black samples from twelve runs on the 10S furnace have been evaluated in A size organic depolarizer primary cells. Service life to 0.9V at continuous load of 16-2/3 ohms ranged from about 19 to 25 hours. Oil feed rate and oxygen enrichment at two positions in the furnace were all significant. The presence of a vanadium additive in the feed oil increased service life about one hour. Data are presented on physical and chemical characteristics of the blacks. High service life was significantly associated with high values of color, tinting strength, and iodine surface area. (Author)

AD-602 759 Div. 7
OTS Prices: HC $3.00/MF $0.50

Heliotek Div., Textron Electronics, Inc., Sylmar, Calif.
HIGH EFFICIENCY SILICON SOLAR CELLS.
Quarterly progress rept. no. 7, 15 Dec 63-15 Mar 64, by Paul A. Berman. 15 Apr 64, 53p
Contract DA36 039SC90777, Proj. 1G6 22001 A053 03
Unclassified report

Descriptors: (*Solar cells, Silicon), (*Silicon, Solar cells), (*Energy conversion, Solar radiation), Design, Manufacturing methods, Costs, Sintering, Evaporation, Diffusion, Crystals, Semiconductors, Resistance (Electrical), Optimization, Matrix algebra.

A polyvariable experiment was performed on P(+)/N solar cells to determine the optimum design for performance at solar intensities of about 350 mW/sq cm. The region of maximum response was determined and indicated that a 13 line grid pattern combined with a 12 minute diffusion time would give the maximum performance for P(+)/N cells operated at solar intensities up to 350 mW/sq cm. A bivariable experiment performed on P(+)/N polycrystalline cells has shown that polycrystalline cells can be optimized and designed for use in concentrated light systems. It was found that cell designs near the region of maximum response actually showed increased efficiencies at 316 mW/sq cm equivalent solar intensities. The fabrication of cells having from 4 to 8 times the active area of the normal 1 x 2 cm cell indicates that large area cells can be made with short circuit current densities and open circuit voltages that compare quite closely with those obtained from 1 x 2 cm. Investigations have been made to determine methods of eliminating the time consuming and relatively expensive junction clean up etch with a more rapid, less costly process.

It is well known that the two-dimensional symmetric bootlace lens, commonly referred to as the R-2R lens, has the property that perfect focusing can be achieved for infinitely many positions of the point source. This report shows that it is the only such lens having this property; indeed, that it is the only one for which perfect focusing can be achieved for three or more pairs of focal points not on the axis of the lens. In the course of this demonstration, equations were obtained for the lens contours determined by two pairs of off-axis focal points. It was seen that the directions of the emerging beam could be different from those of the focal radii of the sources, provided the constraint given was satisfied. Finally, it was also shown that infinitely many lenses are possible for which a pair of conjugate off-axis focal points and a single on-axis focal point are prescribed. (Author)

AD-602 389 Div. 8
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana. Engineering Experiment Station.
A LOG-PERIODIC CAVITY-BACKED SLOT ANTENNA.
Technical rept. no. 78,
by V. A. Mikenas. Jun 64, 85p
Contract AF33 657 10474, Proj. 6278, Task 627801
Unclassified report

Descriptors: (*Slot antennas, Broadband), (*Log periodic antennas, Slot antennas), Design, Dipole antennas, Antenna feeds, Antenna radiation patterns, L band, Electrical impedance, Analysis, Antenna configurations, Cavity resonators, Aircraft antennas.

It has been shown that it is possible by considering the dual of the successful log-periodic dipole arrary to produce a broad-band antenna in the form of a cavity-slot radiator. It has thus been demonstrated that principles for successful operation in the free-space log-periodic dipole array may be usefully applied to the design of a broad-band antenna mounted below a conducting ground plane screen and radiating through it. Although design data are not yet available, it has nevertheless been shown that such an antenna is entirely feasible. At the present stage of development, the basic problem is that of finding a model which operates satisfactorily and then to vary its parameters to discover the predict their roles and significance. Further theoretical analysis of the component parts of the cavity-slot antenna as well as the composite structure should aid materially in perfecting future models. (Author)

AD-602 415 Div. 8
OTS Prices: HC $3.00/MF $0.75

Sylvania Electric Products, Inc., Buffalo, N. Y.
ELECTRONICALLY STEERABLE ARRAY FOR SPACE VEHICLE APPLICATIONS.
Quarterly rept. no. 3,
Feb. 64, 65p
Contract AF30 602 3041, Proj. 4506, Task 450604
RADC TDR64 15
Unclassified report

Descriptors: (*Antennas, Microwave frequency), (*Ferrites, Scanning), Magnetic fields, Tests, Propagation, Extremely high frequency, Equations, Beams (Electromagnetic), Electrical properties, Ferromagnetism, Dielectrics, Diffraction, Millimeter waves, Spacecraft, Satellite antennas.

The report gives the design of scattering and ferrite evaluation experiments. The design of the ferrite evaluation experiments includes an investigation into the properties of the ferrite materials. This is followed by selection of materials and operating regions with respect to frequency and magnetic field for the evaluation tests. Some expected results are given. (Author)

AD-602 425 Div. 8, 5
OTS Prices: HC $4.00/MF $0.75

Radio Corp. of America, Lancaster, Pa.
APPLIED RESEARCH ON HIGH RESOLUTION CAMERA TUBES.
Final summary rept. for 1 Apr 63-31 May 64,
by O. H. Schade, Sr., B. H. Vine, and A. Rotow. 8 Jul 64, 126p
Contract AF33 657 7939, Proj. 4156, Task 415605
AL TDR64 171
Unclassified report

Descriptors: (*Camera tubes, Electron optics), (*Electron optics, Camera tubes), Vidicons, Electron beams, Signal-to-noise ratios, Resolution, Photoelectric materials, Electron tube targets, Magnetic fields, Deflection coils, Deflection, Design, Television equipment, Test equipment.

In order to achieve the desired resolution and signal-to-noise ratio, tubes with vidicon photoconductive targets were built with the required 2 in x 2 in image area. Photoconductive targets typically achieve the 40 db signal-to-noise ratio and give 2000 TV lines at 50% response. In addition, when a suitable distribution of magnetic focus field is used there is very little reduction of resolution from the center to the corners of the image and furthermore, no dynamic focus modulation is required. It was found that the vidicon tubes with field mesh and uniform potential within the deflection space are the most satisfactory even in spite of the fact that some degradation of resolution, due to the 1000 line-per-inch mesh, is present. A study was made of the magnetic focus and deflection fields and of the path of beam under various focus field configurations and deflection amplitudes. A start was made toward computer calculation of beam aberrations in the measured field distributions. Although additional work was done toward plug-type integral mesh targets, the improvements made were not sufficient to make these targets practical. (Author)

AD-602 440 Div. 8
OTS Prices: HC $4.00/MF $0.75

Radio Corp. of America, Somerville, N. J.
DEVELOPMENT OF A GALLIUM ARSENIDE METAL-OXIDE SEMICONDUCTOR TRANSISTOR.
Final technical documentary rept. for 6 May 63-5 May 64,
by H. Becke, R. Hall, and J. P. White. Jul 64, 111p
Contract AF33 657 11402
AL TDR64 146
Unclassified report

Descriptors: (*Semiconductor devices, Transistors), (*Transistors, Processing), Gallium compounds, Arsenides, Silicon compounds, Dioxides, High frequency, Dielectrics, Diffusion, Test equipment (Electronics), Surfaces, Theory, Equations, Production, Measurement.

The work described was intended to demonstrate the feasibility of using gallium arsenide for MOS transistors and to develop a process for the production of a few specific samples. The major problem posed by the development of a useful gallium arsenide MOS transistor was the reduction of the state density at the oxide-gallium arsenide interface. The surface varactor was used, as a test vehicle, in the investigation of this interface. Low interface state densities were obtained, and incorporated into the oxide deposition process. A technique for producing low surface concentration n-type diffusions was then developed and used to fabricate devices. To characterize these devices, a model similar to that proposed for the field effect transistor was extended to include the effect of interface states. The report includes a detailed description of the process developed for the fabrication of n-channel depletion type gallium arsenide MOS transistors. Electrical measurements made on several experimental devices are described, and the average mobility of negative charges at the gallium

Unedited rough draft trans. of Pribory i Tekhnika Eksperimenta (USSR) 1963 [v. 3] no. 5, p. 123-124.

Descriptors: (*Pulse generators, Ultrahigh frequency), (*Electromagnetic pulses, Ultrahigh frequency), Modulators, Magnetic fields, Ferrites, Oscillators, Waveguides, USSR.

A method is described of obtaining ultrahigh frequency pulses with the aid of a broad band ferrite modulator. At a sinusoidal change in controlling magnetic field with amplitude exceeding 20 e, the modulator forms pulses with a power of electromagnetic oscillations of a frequency of 9.4 e, the length of which may vary from 10 to 400 nanoseconds. (Author)

AD-602 355 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Varian Associates, Palo Alto, Calif.
SUBSTRUCTURED P-N TUNNEL JUNCTION FOR MICROWAVE GENERATION.
Final rept. for Jun 62-Apr 64,
by H. Kroemer. Jun 64, 76p
Contract AF33 657 8874, Proj. 4460, Task 446001
AL TDR64 129

Unclassified report

Descriptors: (*Tunnel diodes, Design), Semiconductor devices, Oscillators, Microwave oscillators, Direct current, Stabilization, Circuits, Microminiaturization (Electronics), Manufacturing methods, Germanium, Gallium compounds, Arsenides, Diffusion bonding, Adhesives.

The object of this contract was the construction of self-stabilized tunnel diodes, that is, of tunnel diodes in which the d-c stabilization circuitry has been built into the diode body itself by 'sub-structuring' the pn junction into portions with negative and with positive local conductivities. Such tunnel diode configurations should eventually have been capable of being the microwave equivalents of reflex klystrons, with similar power outputs and frequencies. The experimental techniques to achieve this goal fell more or less naturally into two major categories: (1) Techniques to produce thin (1 micron) degenerately doped semiconductor layers, as the basis for the sub-structured junctions; (2) microelectronic techniques to produce the diode structure itself, on the above layers. The problems in the second category were essentially solved, those in the first category were not. Several techniques were tried: Diffusion, infinite source and thin source liquid epitaxy, all with germanium, and diffusion and vapor epitaxy with gallium arsenide; all failed. (Author)

AD-602 365 Div. 8
OTS Prices: HC $2.00/MF $0.50

Corning Glass Works, Bradford, Pa.
RESISTORS, FIXED, FILM, ESTABLISHED RELIABILITY HERMETICALLY SEALED, GENERAL SPECIFICATIONS FOR.
[1963] 32p

Unclassified report

Descriptors: (*Fixed resistors, Specifications), (*Metal films, Resistors), Quality control, Reliability (Electronics), Acceptability, Design, Packaging, Resistance (Electrical), Soldering, Failure (Mechanics), Moisture, Electric insulation, Vibration, Temperature, Stability, Voltage, Shock (Mechanics), Seals (Stoppers).

These specifications cover the general requirements for hermetically sealed, high-stability fixed film resistors of 1 percent resistance tolerance which are extremely stable with respect to time, temperature and ambient moisture and have a demonstrated failure rate between .1 and .001%1000 hours. (Author)

AD-602 366 Div. 8
OTS Prices: HC $1.00/MF $0.50

Weston Instruments, Inc., Newark, N. J.
A POROUS SUBSTRATE RESISTOR AIMED AT MINIATURIZATION OF METAL-FILM RESISTORS.
Interim development rept. no. 7, 1 Mar-31 May 64,
by T. Matley and R. E. Busch. 31 May 64, 20p
Contract NObsr87542, phase 2, Proj. SR0080303,
Task 9636

Unclassified report

Descriptors: (*Miniature electronic equipment, Resistors), (*Resistors, Miniature electronic equipment), Porous materials, Quartz, Metal films, Nickel, Vapor plating, Electric terminals, Brazing, Silver alloys, Copper alloys.

Cut quartz and molded quartz substrates were produced which show much greater structural uniformity than any other material previously evaluated. Accurate metallizing time was established by evacuating substrates prior to immersion. The system is mechanically controlled. A new braze technique (direct braze method), which eliminates the fritted terminal, promotes complete coverage of the substrate-terminal interface during metallization. (Author)

AD-602 376 Div. 8, 20, 25
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PLASMA PHYSICS AND THE PROBLEM OF CONTROLLED THERMONUCLEAR FUSION: SELECTED ARTICLES,
by L. A. Dushin, V. I. Kononenko, A. I. Skibenko, A. B. Rastrepin, and I. M. Zolototrubov. 10 Jun 64, 40p
FTD MT64 214; TT 64 11885

Unclassified report

Edited machine trans. of mono. [Konferentsiya po Fizike Plazmy i Probleme Upravlyaemogo Termoyadernogo Sinteza (Conference on Plasma Physics and the Problem of Controlled Thermonuclear Systhesis) (no. 2) Kharkov, 1960. Doklady] 1963, Kiev, v. 2, sect. 7, p. 315-342.

Descriptors: (*Plasma physics, Electron density), (*Electron density, Plasma physics), (*Microwaves, Attenuation), (*Scintillation counters, Ionic current), (*Thermonuclear reactions, Scientific research), USSR, Gas discharges, Magnetic fields, Electromagnetic waves, Propagation.

Contents: Plasma diagnostic by several frequencies; Study of the spatial distribution of the density of electrons in plasma by microwaves; On the possibility of application of the method of scintillations for registration of low-energy ions; On measurement of the parameters of plasma in a magnetic field.

AD-602 377 Div. 8, 6
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
DESIGN CONSIDERATIONS FOR TWO-DIMENSIONAL SYMMETRIC BOOTLACE LENSES.
Interim rept.,
by M. L. Kales and R.M. Brown. 18 May 64, 18p
NRL 6075

Unclassified report

Descriptors: (*Radar antennas, Lens antennas), (*Lens antennas, Radar antennas), Scanning, Radar scanning, Waveguides, Optical scanning, Optics, Light transmission, Focusing, Refractive index, Equations, Mathematical analysis.

Chemical elements, Intermetallic compounds, Vapor plating, Diffusion, Transport properties, Electric discharges, Crystal growth, Surface properties, Photoelectric materials, Photosensitivity, Photoelectrons, Diodes (Semiconductor), Semiconductor devices, Manufacturing methods, Impurities, Silicon.

Contents: High resistivity GaAs and deposition on GaAs technology of three-dimensional arrays, investigation of phenomena in II-VI compounds, GaP and GaAsxP (1-x) in epitaxial devices.

AD-602 485 Div. 8
OTS Prices: HC $2.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
X-BAND SOLID-STATE DETECTOR/AMPLIFIER.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 64,
by John J. Brule. 31 Mar 64, 44p
Contract DA36 039AMC03274E, Proj. 1G6 22001A056
Unclassified report

Descriptors: (*Amplifiers, X band), (*Detectors, X band), Tunnel diodes, Microwave amplifiers, Preamplifiers, Parametric amplifiers, Intermediate frequency amplifiers, Transistor amplifiers, Waveguides, Oscillators, Packaged circuits, Mixers (Electronic), Bandwidth, Noise (Radio), Performance (Engineering), Feasibility studies, Limiters, Design.

The components and techniques investigated in Phase I (see AD-431 662) were combined to function as the microwave and IF portions of a receiver. Several possible receiver configurations were analyzed for noise figure, stability, dynamic range, tunability, bandwidth, size, weight, power consumption, feasibility, and compatibility. On the basis of this analysis three receiver packages incorporating waveguide techniques, stripline techniques, and a low noise R.F. preamplifier, were selected as the items which would be developed during the final phase of this program. Specifications were prepared for all major components and initial development was started. Additional investigations of the performance of mixers operating at low (100 microwatt) L.O. powers revealed that noise figures of 9.0 db can be realized at L.O. power levels of -13 dbm with a 2.0 db I.F. noise figure. Preliminary specifications and package layouts for each of the three receivers were also completed. (Author)

AD-602 517 Div. 8
OTS Prices: HC $1.00/MF $0.50

Electromagnetic Technology Corp., Palo Alto, Calif.
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND, AND X-BAND.
Interim development rept. no. 12, 1-30 Jun 64,
15 Jul 64, 20p
Contract NObsr89536, Proj. SF0100201, Task 9294
Unclassified report

Descriptors: (*Frequency convertors, Design), C band, L band, S band, X band, Diodes (Semiconductor), Crystal mixers, Crystal holders, Wave guides, Radiofrequency filters, Klystrons, Oscillators.

Twenty D5253 mixer diodes were received and tests have shown that the impedances are improved, the conversion loss is good, and the high-power properties are similar to the 1N53. An L-band converter, using D5253 crystals, was fabricated and tested with an actual conversion loss of 12 db and a match that nearly meets the specification at the L-band port. Work on the double-balanced converter hardware for the 1N53 and the adaption thereof for the D5253 was terminated with the fabrication of improved hardware specifically designed for the D5253 (see, e. g., AD-432 394). Apparatus for launching the local oscillator and Ka-band signals was fabricated and tested. An improved single-crystal holder for testing the D5253 diode was fabricated, tested and is working satisfactorily. An improved high-pass filter was fabricated, tested and is being used. Some environmental and stability tests on the local oscillator were carried out. The resistive loss study was de-emphasized after the successful testing of the D5253 diode mixer hardware. (Author)

AD-602 627 Div. 8
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
A STUDY OF A FERRITE PHASE SHIFTER.
Interim rept.
by M. L. Reuss, Jr. 8 Jun 64, 11p
Proj. SR008 03 02, Task 9637
NRL 6112
Unclassified report

Descriptors: (*Microwave equipment, Phase shifters), (*Phase shifters, S band), (*Ferrites, Electrical properties), Waveguides, Dielectrics, Phase shifts, Heat transfer.

A study of a DOFL-type phase shifter was conducted at S-band. This phase shifter was capable of operation at power levels above 10 kw peak power. Phase shift and loss were determined as a function of several parameters: ferrite width and height, waveguide height, and presence or absence of dielectric. High power measurements consisted of measuring loss as a function of power level. At low power levels, for a given width of ferrite, much more phase shift can be obtained if the ferrite only partially fills the waveguide in height, but when the height gap is filled with dielectric as required at high power levels, at most a 20% improvement can be obtained over ferrite filling the entire height. In the range of values studied, if the waveguide height is ferrite filled, increasing the ferrite width or waveguide height increases the maximum phase shift while having little effect on loss, this improvement also occurring at high power levels. (Author)

AD-602 630 Div. 8, 7
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF PHASE SELF-ALIGNMENT OF FREQUENCY,
by Yu. P. Belyanin. 7 Jul 64, 5p
FTD TT64 352, TT 64 11978
Unclassified report

Unedited rough draft trans. of Russian patent 155, 181, appl. no. 670,792/26, 21 Jul 60.

Descriptors: (*Frequency stabilizers, Generators), (*Generators, Frequency stabilizers), Automatic, Phase transformers, Signals, Frequency shift, USSR, Patents.

The object of the invention is a method of phase self-alignment of frequency of an automatic generator in accordance with the standard generator, which is distinguished by the fact that, for the purpose of increasing the precision of the self-alignment or self-regulation, one increases the signal of the automatic generator (autogenerator) and the nth harmonic of the autogenerator, mixes with the signal of the standard generator, equalizes, in accordance with the phase, the difference signal obtained with the signal of the autogenerator, and uses the voltage, obtained as a result of the equalization, for regulating the frequency of the autogenerator. (Author)

arsenide surface is calculated from the device characteristics. A comparison is made of the characteristics of a gallium arsenide device with those of a typical silicon device, having the same geometry. (Author)

AD-602 442 Div. 8
OTS Prices: HC $2.00/MF $0.50

Philco Corp., Blue Bell, Pa.
A FUNDAMENTAL STUDY OF EPITAXY BY FLASH EVAPORATION.
Semi-annual scientific rept. no. 2,
by John L. Richards. 30 Mar 64, 41p
Contract AF19 628 2937, Proj. 4608, Task 460804
AFCRL 64 407

Unclassified report

Descriptors: (*Epitaxial growth, Semiconducting films), (*Semiconducting films, Impurities), Single crystals, Diodes (Semiconductor), Diffusion, Vapor pressure, Evaporation, Vacuum, Germanium, Silicon, Gallium alloys, Arsenic alloys, Mica, Temperature, Electrical properties, Energy, Impurities.

A study was made of the impurity doping of flash evaporated epitaxial films of III- V semiconductors. Homo- and heterojunctions were prepared and their electrical characteristics determined. The germanium - germanium epitaxial system was studied so that certain parameters involved in 'in situ' doping by flash evaporation could be determined more readily. An investigation was made of the direct and indirect epitaxy of compound semiconductors on mica substrates. (Author)

AD-602 444 Div. 8, 6
OTS Prices: HC $5.00/MF $1.00

Sperry Gyroscope Co., Great Neck, N. Y.
MULTIPLATE ANTENNA FEED.
Final engineering rept.
by S. Milazzo, J. Lory, C. Rothenberg, and J. Kearney.
May 64, 184p, EB-5297-0460
Contract AF19 628 2966, Proj. 0000
AFCRL 64 422

Unclassified report

Descriptors: (*Antenna feeds, Design), Radar antennas, Radio astronomy, Antenna components, Antenna lobes, Polarization, Multiple beams, Radiofrequency filters, Amplifiers, Antenna radiation patterns, Packaging, Antenna masts.

The report describes the design of a multiplate antenna feed system which consists of tower- and ground-mounted equipment. The feed illuminates each of four elliptical multiplate apertures on the ground, producing a single beam on transmit, and a square cluster of twenty-five beams on receive. The feed system includes techniques for antenna frequency dispersion correction, sidelobe suppression, and polarization control. Various aspects of the feed design, including multiple-beam networks, dispersion correction filters, radiation patterns, phase-locked loops, signal amplification and processing, duplexing, and equipment packaging are described. (Author)

AD-602 445 Div. 8, 30
OTS Prices: HC $7.00/MF $1.50

Stanford Electronics Labs., Stanford Univ., Calif.
RESEARCH IN SYSTEMS THEORY, DEVICES, AND PHYSICAL PHENOMENA FOR MICROSYSTEM ELECTRONICS.
Final technical documentary rept. for Jan 61-Sep 63
Jun 64, 323p SEL 64 037
Contract AF33 616 7726, Proj. 4159, Task 415904
AL TDR64 81

Unclassified report

Descriptors: (*Adaptive control systems, Design), (*Semiconductor devices, Microminiaturization (Electronics)), (*Metal films, Amplifiers), Magnetic core storage, Weather forecasting, Speech recognition, Transistors, Epitaxial growth, Anisotropy, Superconductors, Magnetic tape, Gallium alloys, Arsenic alloys, Phosphorus alloys, Films, Gold, Transistor amplifiers.

The microelectronics program was established to explore and develop new device, circuit, system, and physical concepts which might have influence on, and be influenced by, the rapidly growing field of microelectronics technology. As the program proceeded, attention was concentrated on certain particular areas, notably (1) theory and application of adaptive threshold elements and networks of such elements; (2) theory and fabrication techniques for new classes of solid-state components, with particular emphasis on variable-gain components for adaptive systems; and (3) the study of hot electrons in thin metal films. The central element in the study of adaptive networks was an adaptive linear threshold element (Adaline) which can be adjusted, or trained, to classify a set of many-variable input patterns into any predetermined set of output categories, within certain restrictions. Networks of Adalines were trained to forecast local weather based on barometric pressure readings over a wide area, and to recognize speech waveforms after a limited amount of preprocessing by filters and quantizers. (Author)

AD-602 454 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Army Electronics Research and Development Agency,
Fort Monmouth, N. J.
BETA-EUCRYPTITE-COATED EMITTER STUDY,
by S. Levy. Apr 64, 18p
Task 1G6 22001A055 02 10
AELRDL TR2479

Unclassified report

Descriptors: (*Thermionic converters, Work functions), (*Thermionic emission, Sources), (*Lithium, Ion sources), Lithium compounds, Aluminum compounds, Oxides, Silicates, Refractory coatings, Physical properties, Crystal structure, Diodes.

Lithium aluminosilicate, when heated from 1000C to 1350C, emits lithium ions from its surface. This study evaluates beta (lithium aluminosilicate) eucryptite as an ion-emitting source. Coated refractory emitters have demonstrated an ion-emitter work function of 2.12V with a corresponding Richardson A value of 0.0084. (Author)

AD-602 482 Div. 8, 25
OTS Prices: HC $6.00/MF $1.25

Texas Instruments, Inc., Dallas.
MATERIAL PROCESSING AND PHENOMENA INVESTIGATION OF FUNCTIONAL ELECTRONIC BLOCKS.
Final rept. for Sep 62-Aug 63,
by Rowland E. Johnson. Jul 64, 217p TII 08 64 62
Contract AF33 657 9196, Proj. 4159, Task 415906
AL TDR64 135

Unclassified report

Descriptors: (*Epitaxial growth, Semiconducting films), (*Semiconductors, Molecular electronics), (*Molecular electronics, Semiconductors), Gallium alloys, Arsenic alloys, Phosphorus alloys, Cadmium compounds, Sulfides,

AD-602 707 Div. 8
OTS Prices: HC $1.00/MF $0.50

Stanford Electronics Labs., Stanford Univ., Calif.
A TAPE-RECORDER, TRANSIENT-RESPONSE EQUALIZER.
Technical note for Mar-Jun 63,
by R. L. McMaster. Aug 63, 24p SEL 63 129,
TR1807 5
Contract AF33 657 11144, Proj. 4036, Task 403602
AL TDR64 2

Unclassified report

Descriptors: (*Phase distortion, Countermeasures), (*Electronic recording systems, Phase distortion), Phase transformers, Phase shifters, Transients, High frequency, Theory, Operation, Instruction manuals.

The theory and operation of a simple phase equalizer that will correct much of the phase or delay distortion produced by instrumentation and audio tape recorders is described. This distortion degrades the pulse response by providing different time delays for various frequency components of a pulse or transient waveform. Compensation has also been provided for sag and ringing on rectangular waveforms. This adjustable equalizer has been designed to be used on the playback output of direct-record tape recorders. Operation of the equalizer is described in the appendix, which may be used as an operation manual. (Author)

AD-602 709 Div. 8, 6
OTS Prices: HC $4.00/MF $1.00

Sylvania Electric Products, Inc., Waltham, Mass.
RADAR INTERFERENCE STUDY.
Final rept.
by Walter B. Mills and Joseph F. Clark. May 64, 148p
Contract AF19 604 8484
ESD TDR64 252

Unclassified report

Descriptors: (*Radar interference, Scientific research), Radar reflections, Radar echo areas, Interference, Meteorological phenomena, Atmosphere, Radar equipment, Circuits, Design, Performance (Engineering), Data.

A final report on the two and one half years of activity carried on for the Air Force to establish the radar signatures of interfering targets such as weather, angels and other unknowns. A summary of the data gathered is given, as well as descriptions of two circuits developed to combat the interference. Performance of these circuits when applied to an AN/FPS-8 radar is described and documented. (Author)

AD-602 720 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Radio Corp. of America, Harrison, N. J.
A 10-Mw, X-BAND TUNNEL-DIODE OSCILLATOR.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 64,
by E. Diamond, E. Casterline, R. Gold, and D. Nelson.
31 Mar 64, 32p
Contract DA36 039AMC03195E, Proj. 3A99 21 002

Unclassified report

Descriptors: (*Microwave oscillators, X band), (*X band, Microwave oscillators), (*Tunnel diodes, Microwave oscillators), Gallium alloys, Arsenic alloys, Electric currents, Circuits, Coaxial cables, Electrical properties, Performance (Engineering), Manufacturing methods.

Tunnel diodes with peak currents of 35-75 ma were tested in coaxial circuits with load impedances varied from one to eight ohms. The best results to date were obtained with a 50 ma diode and a load impedance of one ohm. This diode gave 2.0 mw at 7.9 Gc, which is close to the theoretically calculated power output of 2.5 mw at 8.5 Gc. It is expected that minor changes in the circuit will yield between 2.0 and 2.5 mw of rf power at the design frequency of 8.5 Gc. Circuits utilizing the parallel operation of diodes have been designed and are presently being constructed. (Author)

AD-602 721 Div. 8, 30
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
A TRANSISTORIZED DIGITAL CODE TRANSLATOR.
by Mordecai Stein. Sep 61, 32p
DTMB 1496

Unclassified report

Descriptors: (*Digital systems, Decoding), Magnetic tape, Processing, Design, Amplifiers, Circuits, Power equipment parts, Transistors, Equations.

The report summarizes engineering design modifications made on the digital code translator which is used to process IBM tapes on the Remington Rand High-Speed Printer. (Author)

AD-602 722 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Observatoire de Paris (France).
THE STABILITY AND Q-FACTOR OF QUARTZ-CRYSTALS EXCITED BY THE PARALLEL FIELD TECHNIQUE.
Final rept. for 1 Jun 63-31 May 64,
by W. Ianouchevsky. 31 May 64, 31p
Contract DA91 591EUC2962

Unclassified report

Descriptors: (*Quartz resonators, Excitation), Resonators, Crystals, Quartz, Stability, Geometric forms, Crystal holders, Electrodes.

The project was concerned with the development of the excitation techniques derived from the parallel field excitation to the frequency standards and for small crystals to be sealed in HC 27 holders. Phase 1 was devoted to the study of a method for the determination of the geometrical constants of crystals to minimize the coupling between the fundamental and unwanted modes. This enabled to set the tables giving the optima diameters as function of the frequency as well as the possible coutours. Phase 2 concerns the applications of the above method to 1 Mc crystals of about 25mm diameter excited by composite field and to 1 Mc crystals of about 14mm diameter. Phase 3 involved the study of 5 Mc crystals excited by composite and normal field using annular electrodes. (Author)

AD-602 724 Div. 8
OTS Prices: HC $2.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.
Quarterly progress rept. no. 6, 16 Feb-15 May 64,
by H. S. Maddix and J. Gregory. 24 Jun 60, 39p
Contract DA36 039AMC00097E, Task 1G6 22001A055 04

Unclassified report

Descriptors: (*Microwave equipment, Discharge tubes),

AD-602 631 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WAVEGUIDE SWITCH,
by E. A. Domanova and R. A. Valitov. 8 Jul 64 6p
FTD TT64 367; TT 64 11979
Unclassified report

Unedited rough draft trans. of Russian patent 156,193, appl. no. 631,268/26, 18 Jun 59.

Descriptors: (*Waveguide switches, Hall effect), Semiconductors, Germanium, USSR.

A waveguide switch based on the application of Hall's effect in semiconductors, which is distinguished by the fact that, for the purpose of improving the parameters to the surfaces of semiconductor plates which intersect the axis of the waveguide at an acute angle there is imparted the property of various surface recomination. (Author)

AD-602 641 Div. 8
OTS Prices: HC $2.00/MF $0.50

Radio Corp., of America, Harrison, N. J.
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE.
Interim development rept. no. 8, 1 Feb-30 Apr 64,
by G. Hodowance. 29 May 64, 31p
Contract NObsr87535, Proj. SR008 03 04, Task 9293
Unclassified report

Descriptors: (*Traveling wave tubes, X-band), (*Microwave amplifiers, X-band), Ceramic materials, Metals, Noise (Radio), Gain, Voltage, Design, Electron guns, Processing, Viden amplifiers, Detectors, Helixes, Limiters.

The report describes the work done to develop a low-noise, multiple-function, X-band traveling-wave tube. Preliminary revised-design tubes were fabricated and evaluated. This effort resulted in a number of minor design changes which will cause substantial improvements in the performance of the final-design tubes now under fabrication. (Author)

AD-602 650 Div. 8
OTS Prices: HC $2.00/MF $0.50

Army Electronics Research and Development [Agency], Fort Monmouth, N. J.
PHASE RELATIONSHIPS IN PARAMETRIC AMPLIFIERS,
by Wesley G. Matthei. Apr 64, 34p
Task 1G6 22001A056 04 21
AELRDL TR2451
Unclassified report

Descriptors: (*Parametric amplifiers, Phase measurement), (*Phase measurement, Parametric amplifiers), Equations, Gain, Voltage, Resonance, Theory, Frequency, Traveling wavetubes, Signals, Circuits, Electric bridges.

The purpose of the report is to present experimental evidence to show that the phase of the amplified signal in a three-frequency parametric amplifier is independent of the phase of the pump, while the phase of the idler varies directly with the phase of the pump. The experimental evidence is shown to be consistent with the theory of the parametric amplifier. (Author)

AD-602 667 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

ITT Industrial Labs., Fort Wayne, Ind.
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES.
Interim development rept., Phase 2, 2 Mar-2 Jun 64,
by R. W. Hunter. 2 Jul 64, 12p ITT 3303
Contract NObsr87264, Proj. SR00803, Task 9497
Unclassified report

Descriptors: (*Storage tubes, Resolution), Display systems, Cathode ray tubes, Electron beams, Electrodes, Electron guns, Cathode ray tube screens.

Tests indicate high resolution direct view storage tubes require finer than 250 mesh collector screens. This is indicated by line width measurements of the stored line and by microscopic examination of the writing beam at the phosphor. Although the stored line width measurements indicate the resolution with 750 or 1000 mesh is better than with 500 mesh collectors, no improvement was observed in the writing beam itself with the finer mesh. Since the reasons for this are not understood, further testing is warranted. (Author)

AD-602 685 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

Laboratory for Electroscience Research, New York Univ., N. Y.
CONTROL SYSTEMS.
Final rept. for 1 Mar 62-30 Sep 63,
by S. S. L. Chang and J. Ragazzini. 30 Sep 63, 23p
Grant AF AFOSR62 321, continuation of
Contract AF49 638 586
AFOSR 64 1005
Unclassified report

Descriptors: (*Control systems, Theory), (*Abstracts, Control systems), Computers, Adaptive control systems, Communication theory, Noise (Radio), Signals, Mathematics, Linear systems, Functions, Programming (Computers), Statistical analysis, Digital systems, Phase (Electronics), Analog systems, Filters (Electromagnetic wave), Optimization, Dynamics.

The report is concerned with basic theoretical research in the area of 'control systems theory.' The report summarizes the research work performed. The central problem of this project was optimal control systems and their realization.

AD-602 703 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Westinghouse Electric Corp., Elkridge, Md.
PRODUCTION ENGINEERING MEASURE: TRANSISTOR (WX-4001), LOGIC GATE (WM-202), FLIP-FLOP (WM-201), AC BINARY (WM-213).
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by Hauw T. Go. 31 Dec 63, 33p
Contract DA36 039AMC03617E
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), Production, Gates (Circuits), Relaxation oscillators, Silicon alloys, Electrical networks, Diffusion, Photochemistry, Encopsulation, Design, Reliability (Electronics).

To achieve the stated goal failure rates, a systematic plan was initiated to improve the following processes: Diffusion, photochemistry, assembly, encapsulation, and design.

MINIATURIZED X-BAND STRIPLINE DUPLEXER.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 64,
by James W. Christian. 14 Jan 63, 34p
Contract DA36 039AMC03230E, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Radar duplexers, X band), Miniature electronic equipment, Microwave equipment, Limiters, Diodes (Semiconductor), Electronic switches, Circuits, Transmission lines, Electrical properties.

A prototype design of a 3 port stripline circulator was presented. Low loss performance was achieved over a 400 mc band centered at 9,450 mc. The design of a quadrature stripline 3 db hybrid was discussed. Isolation in excess of 18 db was obtained over a 500 mc band, however, the power split was excessive at the high end of the band. An insertion loss of 0.2 db was obtained on this preliminary unit. A number of diode limiter configurations are presented. By varying the electrical spacing between the two diodes and by adjusting the diode stub impedance, insertion loss values ranging from 0.8 to 1.4 db can be obtained on low level, with 33 to 45 db isolation obtained under forward bias. (Author)

AD-602 758 Div. 8
OTS Prices: HC $2.00/MF $0.50

Electronic Defense Labs., Mountain View, Calif.
A TUNABLE TUNNEL-DIODE CONVERTER,
by R. G. Veltrop. 8 May 64, 48p EDL M666
Contract DA36 039AMC03404E
Unclassified report

Descriptors: (*Tunnel diodes, Oscillators), (*Oscillators, Tunnel diodes), (*Tuning devices, Oscillators), Microwave frequency, Microwave networks, S band, Cavity resonators, Noise, Stabilization, Design.

Mechanically tunable tunnel-diode converters were developed which cover the 1.0-to 6.0-Gc frequency range in four bands. Tunnel-diode oscillators are used with separate backward tunnel-diode mixers to achieve low noise figure performance that rivals conventional crystal mixers. The oscillators employ a novel cavity-stabilization technique to obtain a high degree of frequency stability with temperature, bias, and load variations. Design considerations and detailed performance characteristics are presented for an S-band tunnel-diode oscillator and an S-band backward tunnel-diode mixer. (Author)

AD-602 761 Div. 8, 26
OTS Prices: HC $5.00/MF $1.00

Texas Instruments, Inc., Dallas.
ADVANCED FABRICATION PROCESSES FOR FUNCTIONAL ELECTRONIC BLOCKS.
Interim engineering rept. no. 2, 2 Mar-2 Jun 64,
by W. T. Matzen. 15 Jul 64, 151p, TII 03 64 38
Contract AF33 615 1242
Unclassified report

Descriptors: (*Integrated circuits, Design), (*Semiconductor devices, Integrated circuits), Silicone, Transistors, Sputtering, Oxides, Dielectric films, Video amplifiers, Heat, Feedback, Temperature, Stability, Electric filters, Digital systems, Manufacturing methods.

Studies of the silicon adaptive element were continued. Devices with sputtered oxide films were fabricated which exhibit photo and thermal adaption properties. Techniques for using this device in an adaptive logic system were investigated. Experimental studies of the temperature-stabilized substrate are essentially complete so that design of the substrate can be finalized. Several thermal-feedback video amplifiers were fabricated with evaporated lead patterns. A digital filter was fabricated and operated as the IF stage of a transistor radio receiver. All components of the digital filter could be fabricated in integrated circuit form. An RC active filter is being investigated for use as a prefilter for the digital filter or as an independent solution to the band-pass amplifier. It is anticipated that part of this stage will be fabricated on a temperature-stabilized substrate to minimize dependence of parameters on ambient temperature. (Author)

AD-602 768 Div. 8
OTS Prices: HC $3.00/MF $0.75

Philco Corp., Blue Bell, Pa.
ADVANCED ANTENNA TECHNIQUES.
Final rept. for 1 Dec 62-31 Mar 64,
by Leo W. Procopio, Thomas K. Kashihara, and Stephen Czorpita. May 64, 87p
Contract AF19 628 2403, Proj. 4600, Task 460006
AFCRL 64 421
Unclassified report

Descriptors: (*Antenna configurations, Resolution), (*Resolution, Antennas), Theory, Statistical functions, Antenna radiation patterns, Synthesis, Time, Bandwidth, Phased arrays, Ranges (Distance), Azimuth.

A generalized theory of resolution for array antennas was formulated. The theory indicates that angular resolution is determined by the width of the autocorrelation function of the field pattern, and not by the width of the pattern itself. Hence a well defined main beam is not a prerequisite for achieving angular resolution; even noiselike beams can be characterized by an autocorrelation function of narrow width. It is shown that this basic principle leads to the concept of angular dispersion and compression, a phenomenon for angular beam patterns akin to dispersion and compression of radar pulses. During the course of the study new procedures were formulated for synthesizing antennas of given resolution properties. The resolution theory was applied to antennas with time-invariant and time-varying illumination functions, and was used to reexamine in some detail the classical theories of superdirectivity. In addition to an exposition of angular resolution theory, preliminary concepts for achieving angular dispersion and compression, and superdirectivity were also investigated. It is shown that angular dispersion-compression techniques may give rise to significant simplifications in present phased array designs. (Author)

AD-602 771 Div. 8, 26
OTS Prices: HC $4.00/MF $1.00

General Electric Co., Syracuse, N. Y.
TUNNEL DIODES FOR PHASED ARRAY RADAR.
Final rept. for 10 Jul 63-10 Jul 64.
10 Jul 64, 142p
Contract NObsr89328, Proj. SR 0080301, Task 9349
Unclassified report

Descriptors: (*Tunnel diodes, Production), (*Radar equipment, Circuits), Transistor amplifiers, Germanium, Gallium alloys, Antimony alloys, Diodes (Semiconductor), S band, C band, Noise (Radar).

Summaries and conclusions are given regarding the

(*Discharge tubes, Microwave frequency), Electron tubes, Quartz, Gases, Argon, Hydrogen, Heat of activation, Diffusion, Adsorption, Diffusion, Films, Tungsten, Copper, Tungsten compounds, Oxides, Silicon compounds, Dioxides.

Equations expressing tube life as a function of initial square root clean-up rate were derived. Validity of these equations was demonstrated by application to actual life test data. The use of thin metallic films to control gas clean-up in quartz tubes was investigated. Preliminary results with argon at room temperature indicate that an order of magnitude reduction in square root clean-up rate can be achieved by using a thin tungsten film as a diffusion barrier. Tungsten film erosion by the discharge was inhibited by the use of a second thin film of either tungsten oxide or silicon dioxide. Data obtained for the sorption of hydrogen in OFHC copper indicate that hydrogen diffuses into the metal bulk at a rapid rate compared with the observed rates for inert gases in quartz. Hydrogen was found to have an activation energy of 5.7K cal/mole for diffusion in OFHC copper. (Author)

AD-602 725 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
SOLID-STATE MICROWAVE TR-ATR SWITCH PRODUCTION ENGINEERING MEASURES PROGRAM.
Quarterly progress rept. no. 8, 1 Mar-31 May 64, by Paul Basken. 31 May 64, 29p
Contract DA36 039sc86718

Unclassified report

Descriptors: (*Radar duplexers, Diodes (Semiconductors)), (*Electronic switches, Diodes (Semiconductors)), (*Diodes (Semiconductors), Electronic switches), Manufacturing methods, Production, Test methods, Specifications, Life expectancy, X-band, Microwave equipment, Waveguide switches, Solid state physics.

The results of preproduction testing on ten dual TR switches are reported. Two units were life tested for 1000 hours with satisfactory performance. Test data on a typical single TR switch are presented. These tests indicate that the applicable specification can be met. (Author)

AD-602 741 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Owensboro, Ky.
C-BAND TRIODE-CAVITY OSCILLATORS, PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 3, 1 Dec 63-29 Feb 64, by J. D. Marshall. 29 Feb 64, 41p
Contract DA36 039AMC01474E

Unclassified report

Descriptors: (*Triodes, Cavity resonators), (*Microwave oscillators, Triodes), C band, Cathodes (Electron tubes), Dielectric properties, Test equipment (Electronics), Ceramic materials, Electron tubes, Manufacturing methods, Quality control, Production.

Both CW and pulse tubes now have the same outline. A modification in CW tube characteristics has resulted in improved performance. The CW cavity design has been modified to incorporate a tuned cathode section. Dielectric loading has been added to both pulse and CW cavities to achieve more uniform power output over the frequency band. (Author)

AD-602 746 Div. 8
OTS Prices: HC $3.00/MF $0.75

Bell Telephone Labs., Inc., Murray Hill, N. J.
ENGINEERING SERVICES ON TRANSISTORS.
Rept. no. 15 (Final), 1 Apr 60-31 Dec 63, by S. R. Arnold, R. L. Pritchett, J. Kocsis, K. D. Smith, and E. C. Mener. 28 Apr 64, 107p
Contracts DA36 039sc90759, Continuation of Contract DA36 039sc89201, Proj. 1G6 22001A056, Task 4B

Unclassified report

Descriptors: (*Transistors, Germanium), High frequency, Power equipment, Microwave equipment, Circuits, Coaxial cables, Photoengraving, Production, Design, Digital computers.

The report describes all the technical effort expended in the development of high-frequency, high power germanium transistors. The areas included are: (1) general discussion of the high-frequency transistor development project; (2) design theory for high-frequency germanium power transistors of conventional mesa structure, and for planar interdigitated structures; (3) discussion of developments in planar photoengraved microwave power transistor technology, with a specific fabrication sequence; (4) fabrication technology for an improved coaxial power header designed for microwave transistors; (5) presentation of high-frequency measurements on representative development model transistors with a 1-Gc rf output up to 370 mw; (6) overall summary of work. Although the stated objective requirements were not fully met, significant technical progress was made in planar fabrication technology, high-frequency header design, low-resistance electrical contacts, and power transistor design theory. The 1-watt, 1-Gc objective is believed achievable along the general lines of development pursued in the latter period of this contract. (Author)

AD-602 749 Div. 8
OTS Prices: HC $3.00/MF $0.75

Westinghouse Defense and Space Center, Baltimore, Md.
THE SYNTHESIS OF REDUNDANT MULTIPLE-LINE NETWORKS.
Annual rept. no. 2, 1 May 63-1 May 64, by M. K. Cosgrove, P. A. Jensen, W. C. Mann and G. M. Schechter. 1 May 64, 93p WGD 38516, MDE 3573
Contract Nonr3842 00

Unclassified report

Descriptors: (*Networks, Synthesis), (*Redundant components, Reliability (Electronics)), Optimization, Circuits, Digital systems, Errors, Multiple operation, Decision theory, Quality control, Costs, Programming (Computers).

This report is concerned with multiple-line redundancy, a means of increasing the reliability of electronic systems. It describes in detail a procedure for synthesizing redundant systems in an optimum manner. The procedure balances the reliability advantage of redundancy against the cost, weight and power penalties it introduces. It is also applicable to other problems which require the optimization of a large number of binary decisions. The report describes a program which has been written to implement the procedure on a digital computer. The program has been run successfully on example networks and is now ready for specific application. (Author)

AD-602 757 Div. 8
OTS Prices: HC $2.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.

AD-602 817 Div. 8
OTS Prices: HC $3.00/MF $0.75

General Time Corp., Stamford, Conn.
ELECTROMECHANICAL STEPPER.
Final engineering rept. for 8 Mar-6 Jul 64.
6 Jul 64, 100p
Contract NObsr89384, Proj. SR0080302, Task 9366
Unclassified report

Descriptors: (*Actuators, Rotary switches), (*Rotary switches, Solenoids), Remote control systems, Tests, Test methods, Scheduling, Electrical properties, Torque, Experimental data, Mechanical drawings.

This report covers the fourth and final period of design, development, testing and fabrication activites on an Electromechanical Stepper. It states the purpose of the research and development work involved, gives general as well as detail factual data and measurement procedure. The report also includes project performance schedule charts, and a summary of preceding efforts plus recommendations for future action. A number of test sheets and drawings, referring to the different solenoid models, are incorporated and will be found under section Appendices. (Author)

AD-602 835 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Sperry Microwave Electronics Co., Clearwater, Fla.
DEVELOPMENT OF ADVANCED MICROWAVE COMPONENTS AND TECHNIQUES, PLANAR HEXAGONAL FERRITES AND DEVICES.
Quarterly rept. no. 4, 28 Dec 63-28 Mar 64.
Jun 64, 38p
Contract AF30 602 2757, Proj. 4506, Task 450602
RADC TDR64 242
Unclassified report

Descriptors: (*Phase shifters, Ferrites), (*Ferrites, Dielectric properties), Microwave equipment, Production, Yttrium compounds, Zinc compounds, Copper compounds, Nickel compounds, Anisotropy, Hysteresis, Crystallography, C-band, X-band, X-ray diffraction analysis.

Efforts to reduce the dielectric loss tangent of planar hexagonal ferrites through the use of iron deficient compositions have produced only marginal improvements in the Zn2Y materials and no observable improvement in the loss tangent of Cu0.75Zn1.25Y. When iron deficiencies of as much as ten percent are used diffraction lines corresponding to crystal structures other than the Y structure are seen. X-ray diffraction studies of nickel ferrite pressed in the presence of a dc magnetic field have shown positive evidence of crystallite orientation. Narrowest X-band linewidth measured on this partially oriented nickel ferrite is 268 oe. An analysis of the application of planar hexagonal ferrites in phase shifters, with consideration given to their ultimate use in switching devices, is reported. The effect of dielectric loading on planar hexagonal ferrite phase shifters is also discussed. Effects of the planar anisotropy field on the performance of differential phase shifters is determined, and this anisotropy field is shown to have a detrimental effect on phase shifter operation. Some measurements on the response of phase shifters utilizing planar hexagonal ferrites at C-and X-band are given. The hysteresis loop parameters of the planar hexagonal ferrites are reported. (Author)

AD-602 836 Div. 8
OTS Prices: HC $2.00/MF $0.50

Syracuse Univ., N. Y.
APPLICATION OF TUNNEL DIODES AS ACTIVE SCATTERER LOADS,
by H. Gruenberg and T. W. Bristol. Jun 64, 35p
Contract AF30 602 2900, Proj. 4519, Task 451901
RADC TDR64 216
Unclassified report

Descriptors: (*Antenna components, Tunnel diodes), (*Tunnel diodes, Electrical properties), Microwave equipment, Antennas, Radar antennas, Radar echo areas, Dipole antennas, Optimization, Stability, Negative resistance circuits, Amplifiers, Diodes (Semiconductor).

The report consists of preliminary studies related to the application of active loads, such as tunnel diodes, to antenna systems for the purpose of enhancing the echo area. Problems discussed include the elaboration of the relevant diode characteristics, an optimization procedure for a dipole-tunnel diode system, stability considerations, and some thoughts on the treatment of nets of diodes as negative-resistance sheets. (Author)

AD-602 838 Div. 8
OTS Prices: HC $5.00/MF $1.00

New Mexico Univ., Albuquerque. Engineering Experiment Station.
THE DRIVING POINT IMPEDANCE OF AN ELECTRICALLY SHORT CYLINDRICAL ANTENNA IN THE IONOSPHERE,
by William E. Blair. Jun 64, 160p UNM TR-EE-109
Contract Nonr2798 01
Unclassified report

Descriptors: (*Electrical impedance, Antennas), (*Antennas, Cylindrical bodies), (*Satellite antennas, Models (Simulations), Space communication systems, Radio communication systems, Dipole antennas, Ionosphere, Mathematical models, Anisotropy, Green's function, Integral transforms, Electric fields, Very low frequency, Electrical properties, Numerical analysis.

One of the problems in the design of a satellite radio communication system is to design an antenna that can be used satisfactorily to transmit to, and receive from, the satellite over a desired frequency band. This analysis presents a theoretical study of the driving-point impedance of a cylindrical antenna imbedded in the ionosphere. The antenna model is a cylindrical, center-fed, perfectly conducting antenna. The ionosphere model is a homogeneous, anisotropic, neutral cold plasma (magneto-ionic) medium. The anisotropy is caused by the earth's magnetic field which is assumed to be uniform in the vicinity of the antenna. The antenna driving-point impedance is calculated for the antenna oriented both to parallel and perpendicular to the earth's magnetic field. The results are valid for all frequencies below HF, with special emphasis on the VLF spectrum. (Author)

AD-602 840 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Lewis (E. B.) Co., Inc., East Hartford, Conn.
REPORT TO THE QUARTZ CRYSTAL INTEGRATION COMMITTEE.
5 May 64, 40p
Contract DA36 039SC86737
Unclassified report

A portion of this document is illegible or non-reproducible.

Descriptors: (*Quartz resonators, Production), (*Crystal filters, Production), Resonators, Radiofrequency filters, Design, Electrodes, Crystal holders, Tests.

work performed and the results obtained in the device and circuits programs during the past year. Detailed discussions of all aspects of the fourth quarter work for both programs are given. Device program work during the fourth quarter included setting up a pilot line for making the 50 contract devices and for determining the distribution of device parameters relative to contract specifications. A study of device R sub s was made to compare the measured values with, first, the calculated values based on actual device geometry and, second, with the minimum theoretical value for the device. In addition, a device reliability study was performed. Circuits program work included noise figure measurements of a tunnel diode amplifier at S-and C-bands. Tests of amplifier phase-amplitude stability were completed. Measurements of the high frequency parameters of contract tunnel diodes using a newly developed technique were also completed. The dynamic range and noise figure of a self-oscillating S-band tunnel diode converter with external synchronizing signal were evaluated. RF and video pulse burn-out tests were made with contract diodes. (Author)

AD-602 780 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Bell Telephone Labs., Murray Hill, N. J.
MICROWAVE DIODE RESEARCH.
Quarterly progress rept. no. 7 (Rept. no. 16), 10 Dec 63-9 Mar 64,
by J. C. Irvin and J. G. Josenhans. 20 Jun 64, 37p
Contract DA36 039sc89205, continuation of contract DA36 039sc85325, Proj. 1G622001A056
Unclassified report

Descriptors: (*Diodes (Semiconductor), Microwave equipment), (*Varactor diodes, Microwave equipment), Harmonic oscillators, Gallium compounds, Arsenides, Silicon, Epitaxial growth, Parametric amplifiers, Noise, Gain, Bandwidth, Manfacturing methods.

Different structures are considered for a high-voltage (harmonic generator) GaAs varactor. The performance of each design is calculated and, for comparison, also that of an epitaxial silicon varactor. All GaAs models are found to offer substantially higher quality factors than the Si model. Of the GaAs designs investigated, an abrupt junction formed on an eptiaxial layer with an exponential impurity distribution appears the most promising. Parametric amplifier diodes show noise in excess of thermal noise when driven into the forward conduction region where the gain-bandwidth product and the gain stability are enhanced. On the basis of a shot noise theory, it is shown that the excess noise is expected to increase linearly with the average forward current. Experimental measurements show that the shot noise in gallium arsenide diodes (both diffused and surface barrier) is within 50 per cent of the theoretical value. However, silicon diodes show excess noise an order of magnitude larger than that predicted by the theory. This result may be attributed to carrier storage effects which were not included in the theoretical treatment. (Author)

AD-602 791 Div. 8, 22
OTS Prices: HC $2.00/MF $0.50

Harry Diamond Labs., Washington, D. C.
PRECISION OSCILLATORS FOR MILITARY ELECTRONIC TIMERS,
by J. M. Shaull. 15 Jun 64, 47p
Projs. 1P523801A300, 46300
HDL TR1235
Unclassified report

Descriptors: (*Timing devices, Oscillators), (*Oscillators, Timing devices), Radiofrequency oscillators, Harmonic oscillators, Relaxation oscillators, Circuits, Fuze functioning elements, Reliability (Electronics), Reviews.

A need has developed for high-accuracy military electronic timers that require miniature precision audio-frequency oscillators. Usually, operation is required over the temperature range of -55C to +71C along with shock and spin accelerations up to 20,000 g. The types of oscillators presently in use and their capabilities and limitations are discussed. Prototype oscillators of the LC, RC, and saturable-inductance types have achieved better than 0.1 percent stability in laboratory tests over the temperature range required. Ruggedness requirements and long-term stability are seen as the major problems. There is evidence to indicate these difficulties may be overcome with good reliability. (Author)

AD-602 793 Div. 8
OTS Prices: HC $1.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
BROADBAND MICROWAVE POWER LIMITERS.
Quarterly rept. no. 4, 1 Apr-30 Jun 64,
by L. Nathanson. 30 Jun 64, 18p
Contract NObsr89462, Proj. SR0080302, Task 9637
Unclassified report

Descriptors: (*Microwave equipment, Limiters), (*Limiters, Broadband), (*Samplers, Crystals), Semiconductor devices, Diodes (Semiconductor), Power supplies, Coupling circuits, Transmission lines, Coaxial cables.

The report covers the solution to the last basic problem area -- the crystal power sampler. The theory and design associated with the directional coupling loop is discussed, and experimental data is included which illustrates its advantages and effectiveness. (Author)

AD-602 816 Div. 8, 12
OTS Prices: HC $1.00/MF $0.50

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
ANTENNA WINDOW: A TECHNIQUE FOR PROPAGATION THROUGH A PLASMA SHEATH.
Interim engineering rept. no. 12, 15 Mar-15 Jun 64,
by Robert G. DeLosh. 1964, 9p Bendix BSR985
Contract AF33 616 8420
Unclassified report

Descriptors: (*Plasma sheath, Wave transmission), (*Antenna components, Design), (*Reentry vehicles, Antennas), Radio waves, Propagation, Cryopumping, Guided missile antennas, Helical antennas, Radio transmitters, Electric switches, Pneumatic devices, Liquefied gases, Cooling, Thermoelectricity, Vacuum systems.

Several improvements of the antenna window system (see, e.g., AD-426 970) are described including the use of cryogenic pumping to evacuate the Dewar, inclusion of a spare transmitter in the payload, which may be electrically substituted for the main transmitter in the advent of a pre-launch transmitter failure; and, replacement of the solenoid switch driver with a pneumatic bellows. (Author)

tubes), Performance (Engineering), Manufacturing methods, Specifications.

Transfer of tube construction from the laboratory to the manufacturing area resulted in a marked increase in incidence of cathode failure. Experiments conducted to determine the cause of this cathode problem pointed to ion bombardment of the cathode during the reflex mode of operation. Attempts were made to minimize the ion bombardment condition while maintaining tube performance. (Author)

AD-602 860 Div. 8
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 7, 14 Nov 63-14 Feb 64, by W. J. Noroski. 14 Feb 64, 30p
Contract DA36 039sc86731

Unclassified report

Descriptors: (*Cathode ray tubes, Manufacturing methods), Vapor plating, Vacuum apparatus, Electrodes, Coatings, Glass, Graphite, Voltage, Sensitivity, Scanning, Silicates, Water, Hysteresis, Design, Processing.

The program was advanced to the point where all is ready for the beginning of the preproduction and pilot-run phases of the contract. Processing details were established and approved. Final modifications to the equipment were made and checked out under actual operating conditions. Engineering samples have been completed and shipped to the Contracting Agency. The engineering samples underwent a thorough electrical evaluation, thereby finalizing the test- and performance-characteristics for the three models of Deflectron. A revised test specification was written for all three Deflectron tube types. All parts and materials necessary for the completion of the program are on hand. (Author)

AD-602 865 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

Lear Siegler, Inc., Grand Rapids, Mich.
DEVELOPMENT OF EXPERIMENTAL GAS DISCHARGE DISPLAY.
Quarterly progress rept. no. 3, 24 Nov 63-24 Jun 64. Jul 64, 16p LSI GR-1457
Contract NObsr89201, Proj. SR0080301, Task 9498

Unclassified report

Descriptors: (*Display systems, Discharge tubes), (*Discharge tubes, Display systems), Gas discharges, Photoelectric materials, Resistors, Switching circuits, Storage tubes.

A summary is given of progress in the development of a display panel with internal storage and consisting of an X-Y matrix of individual gas cells which can be fired selectively by a short triggering pulse.

AD-602 872 Div. 8
OTS Prices: HC $3.00/MF $0.75

Melpar, Inc., Falls Church, Va.
MOLECULAR CIRCUIT DEVELOPMENT.
Quarterly rept. no. 1, 12 Mar-12 Jun 64, 12 Jun 64, 82p
Contract NOw64 0568d

Unclassified report

Descriptors: (*Molecular electronics, Circuits), (*Semiconducting films, Materials), (*Semiconductor devices, Design), Printed circuits, Dielectrics, Films, Neodymium compounds, Dysprosium compounds, Cerium compounds, Boron compounds, Oxides, Cadmium compounds, Selenides, Zinc compounds, Tellurides, Triodes, Diodes (Semiconductor), Amplifiers, Radiation damage.

Contents: semiconducting films (cadmium selenide, zinc telluride), dielectric films (neodymium oxide - boric oxide films, dysprosium oxide - boric oxide films, ceric oxide - boric oxide films), amorphous semiconducting films, field effect triode (dielectric film materials, life testing, device layout, vacuum systems), thin film diodes (theorectical considerations, experimental measurements), function synthesis studies, operational amplifiers, radiation studies.

AD-602 893 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

Aerospace Research, Inc., Boston, Mass.
DESIGN AND FABRICATION OF A SLEDBORNE MULTICOUPLER.
Final rept. for 15 Mar-1 Dec 63. 1 Dec 63, 17p ARI Pub185
Contract AF29 (600) 4048

Unclassified report

Descriptors: (*Rocket-propelled sleds, Telemeter systems), (*Antennas, Coupling circuits), (*Coupling circuits, Design), Band-pass filters, Standing wave ratios, Electrical impedance, Transmission lines, Resonators, Dielectrics.

A summary is given of work concerning the design and fabrication of an extremely rugged multicoupler that couples six transmitters to one antenna in the frequency range of 800 Mc/s to 820 Mc/s, with an isolation of at least 20 db between channels. The multicoupler was designed for use on the rocket sled at Holloman Air Force Base.

AD-602 924 Div. 8
OTS Prices: HC $1.00/MF $0.50

SFD Labs., Inc., Union, N. J.
DEVELOPMENT OF AN X-BAND CW CROSSED-FIELD AMPLIFIER.
Interim development rept. no. 4, 31 Mar-30 Jun 64, by M. Arnum. Jul 64, 20p SFD 33IDR4
Contract NObsr89503

Unclassified report

Descriptors: (*Microwave amplifiers, X-band), (*Crossed field devices, Amplifiers), Electron tubes, Impedance matching, Transmission lines, Waveguides, Oscillation.

Reactively loaded interdigital line slow wave structures, both choke and crown supported, were evaluated at cold test. Emphasis was placed on obtaining an acceptable circuit impedance match across the desired frequency band. Several circuit impedance matching methods were investigated. Construction of two tubes incorporating such slow wave structures for hot test evaluation were completed, and others are in progress. (Author)

AD-602 928 Div. 8, 5, 6
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.

A summary is given of progress of a production engineering measure study for the CR-(XM-46)/U resonator which is a third overtone, AT-cut crystal for filter application in the frequency range of 30 - 70 MC/s.

AD-602 842 Div. 8, 30
OTS Prices: HC $3.00/MF $0.75

Cornell Aeronautical Lab., Buffalo, N. Y.
HIGH-TEMPERATURE ANTENNA INVESTIGATION AND DEVELOPMENT.
Interim engineering rept. no. 5 for the period ending 30 Jun 64,
by Godfrey F. Buranich. 1964, 59p UB1807E5
Contract AF33 657 11100, Proj. 6278, Task 627802
Unclassified report

Descriptors: (*Antennas, High-temperature research), (*Helical antennas, High-temperature research), S band, Heat-resistant metals and alloys, Nickel, Tantalum, Copper, Borides, Electrical properties, Tests.

This quarterly report summarizes investigations which were made for developing antennas suitable for prolonged operation at a temperature of 2000F. The efficiencies of S-band helical antennas made of various metals were compared and no significant reduction in efficiency occurred with metals having resistivities as high as 120 microhm - cm. Tests made on nichrome and coated tantalum helical antennas at 2000F showed no degradation with temperature. Experimental tests for determining the relative power handling capabilities of copper, TD nickel, coated tantalum and Boride Z metals at 2000F are being made. (Author)

AD-602 843 Div. 8, 12, 19
OTS Prices: HC $3.00/MF $0.75

Hughes Aircraft Co., Culver City, Calif.
STUDY OF ADVANCED ANTENNA TECHNIQUES FOR AEROSPACE VEHICLE DOPPLER VELOCITY SENSORS,
Rept. for Mar 63-Mar 64,
by J. R. Miller. Jul 64, 66p
Contract AF33 657 10672, Proj. 4427, Task 442701
AL TDR64 163
Unclassified report

Descriptors: (*Slot antennas, Design), (*Doppler navigation, Aerospace craft), (*Reentry vehicles, Guidance), Space navigation, Spacecraft, Guided missile antennas, Waveguides, Antenna radiation patterns, Antenna configurations, Waveguide slots, Electrical properties, Tolerances (Mechanics), Velocity.

A four-port, dual-mode antenna that generates four symmetrically oriented beams about its normal was designed and built. Approximately 30-db isolation between ports was measured with this two-dimensional slot array, and overall efficiency of the antenna was 71 percent. Agreement between theory and experiment was good for all parameters. (Author)

AD-602 844 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
FIELD EMISSION IN VACUUM VOLTAGE BREAKDOWN,
by G. E. Vibrans. 8 May 64, 40p LL TR353
Contract AF19 628 500
ESD TDR64 327 Unclassified report

Descriptors: (*Field emission, Determination), (*Electrodes, Field emission), Spheres, Filaments, Electron beams, Cratering, Anodes (Electron tubes), Thermal stresses, Electric fields.

Field intensification and emitting area are determined for a spheroid and a whisker-shaped protrusion. The effects of an inhomogeneous field around a protrusion on the transmission coefficient for field emission are computed, and examples are given. The resistive heating of an emitter is analyzed for a case in which both the resistivity and the emission are temperature dependent. An instability is pointed out, and the external resistance which stabilizes the emission of a whisker is given. The spreading of the emitted beam due to field distortion at the protrusion and to space-charge repulsion is computed separately and given in general form. It is concluded that the beam spreads faster than previous hypotheses assume. The formation of small craters at the anode by single electron beams is questioned. (Author)

AD-602 855 Div. 8
OTS Prices: HC $2.00/MF $0.50

Illinois Univ., Urbana. Engineering Experiment Station.
SOME THEORETICAL ASPECTS OF LOG PERIODIC AND CONTINUOUSLY SCALED ANTENNA DESIGNS.
Antenna Lab. technical rept. no. 76,
by R. Mittra and K. E. Jones. Jun 64, 46p
Contract AF33 657 10474, Proj. 6278, Task 627801
Unclassified report

Descriptors: (*Antennas, Broadband), (*Log periodic antennas, Design), Electromagnetic waves, Propagation, Dipole antennas, Helical antennas, Transmission lines, Theory.

Consideration is given to certain theoretical aspects of LP and CS antenna designs. It is shown that the problem of designing a truly frequency independent antenna with an ideal transient response remains unsolved to date and it is doubtful that one such practical antenna could ever be designed. Floquet's theorem for periodic structures is generalized to structures containing additional symmetries and the notion of effective period for such structures is intruduced. The K-Beta diagrams for several periodic structures are discussed and it is indicated how one could predict the potentially successful type of structures on the basis of their K-Beta diagram. A non-uniform transmission line with CS properties, whose characteristics are close to those of the LPDA is studied and several general conclusions are drawn on the basis of the results of the study. It is pointed out that for analysis and design purposes, the log-periodic variations in a LP device should be viewed as perturbations and that the emphasis should be laid on the CS portion of the behavior.

AD-602 859 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
Quarterly progress rept. no. 11 for 9 Dec 63-8 Mar 64,
by Edward T. Rate. 8 Mar 64, 16p
Contract DA36 039SC85965
Unclassified report

Descriptors: (*Cathode ray tubes, Production), Electron guns, Ion bombardment, Cathodes (Electron

2413, NSF GP-2684; Contracts Nonr222 53, Nonr222 57, Nonr222 92, Nonr3656 11.

Descriptors: (*Electronics, Scientific research), Bionics, Circuits, Electron beams, Plasma physics, Solid state physics, Waveguides, Scattering, Personnel.

A review of research in the following areas is given: bioelectronics, circuits, electron streams, plasmas, radiation and propagation, solid-state electronics, and systems.

AD-602 974 Div. 8
OTS Prices: HC $2.00/MF $0.50

Systems, Inc., Orlando, Fla.
TIGHTER TOLERANCE CRYSTAL UNITS.
Quarterly progress rept. no. 3, 15 Dec 63-15 Mar 64,
by S. B. Boor and R. B. Angove. 15 Apr 64, 40p
Contract DA36 039AMC02335E, Proj. 3A99 15 007
Unclassified report

Descriptors: (*Miniature electronic equipment, Crystal oscillators), (*Crystal oscillators, Design), Crystals, Crystal holders, Tolerences (Mechanics), Circuits, Thermistors, Capacitors, Frequency, Single sideband communication systems.

The design of temperature compensated crystal units is discussed. The networks, including both compensation and frequency adjustment features, are described. The crystal design is discussed. Characteristics of typical compensated units are described and evaluated. (Author)

AD-602 982 Div. 8, 15, 30
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PARTIAL FRACTIONS AND ERROR-CORRECTING CODES,
by E. Weiss. 6 Jul 64, 20p LL 1964 37
Contract AF19 628 500
ESD TDR64 348
Unclassified report

Descriptors: (*Coding, Sequences), (*Sequences, Coding), Communication theory, Recursive functions, Set theory, Algebra, Polynomials, Power series, Transformations (Mathematics), Corrections, Errors.

In this note it is shown how partial fractions may be used to derive the properties of linear recursive sequences and, in particular, of Bose-Chaudhuri codes. One of the novel features of this method is a new and transparent proof of the basic result of Mattson-Solomon. (Author)

PROJECT WEST FORD PAYLOAD TELEMETRY SYSTEM,
by W. T. Higgins, L. A. Jacobson, and J. B. Rankin.
20 Jan 64, 48p LL TR343
Contract AF19 628 500
ESD TDR64 21

Unclassified report

Descriptors: (*Telemeter systems, Design), Telemetering transmitters, Telemetering antennas, Beacons, Circuits, Performance (Engineering), Measurement, Data transmission systems, Pulse modulation, Radar tracking.

The beacon track and performance telemetry system used in the various Project West Ford communication payloads is described. The dipole dispensing rate, the dispenser spin, tumble and temperature, as well as the system power-supply voltage, were measured and transmitted to the West Ford sites by means of a pulse-duration modulation system. In addition, the telemetry transmitter served as a beacon for accurate ground-based radar tracking of the payloads. The most important system considerations were efficiency, low power, simplicity, and high reliability. A tabulation of the received data and the interpretation of the data are given. (Author)

AD-602 939 Div. 8, 26
OTS Prices: HC $6.00/MF $1.25

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TO INCREASE TRANSISTOR RELIABILITY FOR THE 2N656.
Final progress rept. for 1 Jul 62-31 Mar 64.
31 Mar 64, 248p TII 03 64 43
Contract DA36-039sc86730

Unclassified report

A portion of this document is illegible or non-reproducible.

Descriptors: (*Transistors, Reliability (Electronics)), (*Quality control, Transistors), Engineering, Production control, Silicon, Coatings, Diffusion, Banding, Welding, Encapsulation, Test methods, Gold alloys, Stresses, Tests, Military requirement.

The process improvement work on the 2N656 device was completed during the first twelve months of the contract. The resultant transistor is a rugged planar device utilizing gold alloy wafer mounting, ultrasonic lead bonding with no inline etch or wafer coating and is capable of 15 watts dissipation at 100C case temperature. Improved facilities, processes and process controls in the diffusion, photo resist, contract evaporation and assembly areas have all contributed to the significantly improved product quality and uniformity. The major portion of reliability improvement has resulted from the planarization of the device and the re-design of the package which replaced the single 0.017 in. diameter wire slug support with two approximately 0.015 in. thick by 0.090 in. wide tabs. Stress tests conducted on 1,100 production planar devices confirm that the improved transistor exceeds the contract objective of 0.01% per thousand operating hours at a 90% confidence level. (Author)

AD-602 940 Div. 8, 26
OTS Prices: HC $6.00/MF $1.25

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TO INCREASE TRANSISTOR RELIABILITY.
Final engineering rept.
by Doyce R. Briggs. 30 Jul 64, 246p TII 03 64 45
Contract DA36 039sc86730

Unclassified report

Descriptors: (*Transistors, Reliability (Electronics)), (*Quality control, Transistors), Production control, Engineering, Silicon, Crystals, Crystal growth, Heat exchangers, Joining, Cleaning, Welding, Oxides, Surface area, Experimental data, Tables.

Contents:
Silicon Material Preparation
Thermal Dissipation of the Package
Assembly
Cleaning Techniques
Final Preparation Prior to Sealing-Parts Cleaning
Controlled Formation of Surface Oxides Controlled Assembly Technique
Cold Welding
Post Weld Conditioning

AD-602 941 Div. 8, 26
OTS Prices: HC $4.00/MF $1.00

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TO INCREASE TRANSISTOR RELIABILITY. PROCESS SPECIFICATIONS. 2N656 SERIES.
Final engineering rept.
Jul 64, 147p TII 03 64 46
Contract DA36 039sc86730

Unclassified report

Descriptors: (*Transistors, Reliability (Electronics)), (*Quality control, Transistors), Engineering, Production control, Specifications, Manufacturing methods, Silicon, Crystals, Cleaning, Acids, Diffusion, Plating, Joining.

Manufacturing specifications covering equipment, material, and procedure.

AD-602 942 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES TO INCREASE TRANSISTOR RELIABILITY. PROCESS SPECIFICATIONS.
Final engineering rept.
Jul 64, 80p TII 03 64 42
Contract DA36 039SC86730

Unclassified report

Descriptors: (*Transistors, Reliability (Electronics)), (*Quality control, Transistors), Instruction manuals, Cleaning, Specifications, Tests, Silicon, Crystals.

AD-602 949 Div. 8, 30
OTS Prices: HC $5.00/MF $1.00

Electronics Research Lab., Univ. of California, Berkeley.
ELECTRONICS RESEARCH LAB. CONSOLIDATED QUARTERLY PROGRESS REPORT NO. 13.
Rept. for 16 Feb-15 May 64,
15 May 64, 159p
Contract AF33 615 1045; Grant AF AFOSR139

Unclassified report

Also supported by Contract AF33 615 1078; Grants, AF AFOSR117 63, AF AFOSR230 64, AF AFOSR292 64; Contracts DA36 039AMC02164E, DA ARO D31 124G317; Grants NsG-354, NSF GP-2203, NSF GP-2239, NSR GP-

sonic flow separates over the classical downstream-facing step and over a cavity. The experiments were conducted in the Mach number range 2.0 to 4.0 on a model having a ducted, one-foot diameter, axisymmetric body. The model provided step heights of 0.250, 1.020, and 1.675 inches, cavity lengths of 0.837 and 1.675 inches, and a cavity depth of 1.675 inches. The recompression shoulder of the cavity had either a square or a rounded shape. In general, the pressure rise at reattachment is found to be in good agreement with Korst's theory. The shape and scale of the reattachment pressure distribution are influenced considerably by Mach number. Reattachment occurs at a point where the pressure rise is about 50% complete. A point of flow reversal is found to be located upstream of the reattachment point. (Author)

AD-602 430 Div. 9, 30
OTS Prices: HC $3.00/MF $0.50

Bureau d'Analyse et de Recherche Appliquees, Issy-Les-Moulineaux (France).
ANALOG STUDY OF HYDROFOILS NEAR THE FREE SURFACE,
by Daniel Fruman. Apr 64, 53p
Contract N62558 3645

Unclassified report

Descriptors: (*Hydrofoils, Fluid dynamic properties), Lift, Drag, Hydrodynamic configurations, Camber, Thickness, Fluid flow, Load distribution, Perturbation theory, Mathematical analysis, Analog system, Electrical equipment.

This report is the continuation of a research work which has already been published (AD-296 991). It refers to the determination of the camber and tickness distribution concerning a profile placed near the free surface of a flow when the pressure distribution law along the chord is given. The method allowing the utilization of the given results in the previously quoted report to obtain a profile of given hydrodynamic characteristics is presented. An analog verification of the small perturbations linear theory is given. The last part concerns the tandem problem that is studied within the scope of the same theory. An appendix shows the electrical apparatus utilized to obtain the determination of the free surface of a flow being perturbated by a distribution of singularisaties when the theoretical solution is known for one of them.

AD-602 487 Div. 9
OTS Prices: HC $2.00/MF $0.50

Giannini Controls Corp., Malvern, Pa.
SEPARATED FLOW IN CURVED CHANNELS WITH SECONDARY INJECTION.
by H. A. Curtiss, O. G. Fell and D. J. Liquornik.
25 May 64, 44p ARD-TR020 01
Contract AF49 638 1218
AFOSR 64 0860

Unclassified report

Descriptors: (*Amplifiers, Hydraulic systems), (*Control systems, Hydraulic systems), Fluid flow, Injection, Momentum, Gain, Nozzles, Turbulent boundary layer, Incompressible flow.

Injection of secondary fluid flow into a primary flow confined in a curved channel is shown to be a powerful technique for use in fluid state amplification. The secondary injection continuously and progressively alters the separation characteristics of the confined primary flow, resulting in large proportional changes in the channel output flows. A fundamental study of the method with incompressible, turbulent boundary layer flow in a range of varying curvature channels was conducted to learn about the flow characteristics and passage shape parameters relevant to proportional amplification. Several injection methods and velocities were investigated with the main emphasis on the effects of this injection on the flow characteristics within the channels. Preliminary analytical techniques were developed which compared favorably with the experimental results. An overall comparison of the mass flow and momentum gains obtainable for various injection and channel configurations is presented. (Author)

AD-602 502 Div. 9, 1
OTS Prices: HC $2.00/MF $0.50

Vehicle Research Corp., Pasadena, Calif.
A LIFTING SURFACE THEORY FOR WINGS EXTENDING THROUGH MULTIPLE JETS IN SEPARATED FLOW CONDITIONS,
by E. Cumberbatch and T. Yao-Tsu Wu. 22 Oct 63, 36p
VRC 10
Contract Nonr2388 00

Unclassified report

Descriptors: (*Wings, Aerodynamic characteristics), Propellers (Aerial), Aerodynamic configurations, Fluid flow, Jets, Drag, Lift, Cavitation, Theory, Downwash, Short take-off planes, Vertical take-off planes, Tilt wings, Wake, Aspect ratio.

A lifting surface theory for wing-propeller slipstream interactions in separated flow conditions was developed. The case where the flow over wing portions immersed in the propeller slipstreams (jets) is attached while the flow over the wing outside the jets is separated has been treated in detail. The case where flow is separated both inside and outside the jets may be analyzed in a similar manner. The theoretical development combines non-separated flow analyses based on the Rethorst Lifting Surface Solution with cavitation (separated flow) theory developed by Wu and Wang. A lifting surface representation based on a generalization of Weissinger's approximation was developed. In the separated flow regions, the location of the lifting line and the station where downwash boundary conditions must be satisfied are determined from cavitation theory and/or experimental results. Prediction of aerodynamic characteristics in separated flow conditions is of special concern in the development of tilt wing and deflected slipstream V/STOL aircraft where flow separation may occur during the transitional flight from hovering to cruise. (Author)

AD-602 554 Div. 9, 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT CERTAIN CASES OF ABILITY OF EQUATIONS OF GYROSTAT MOTION TO BE INTEGRATED.
by L. N. Sretenskii. 10 Feb 64, 10p
FTD MT63 230; TT 64 11922

Unclassified report

Edited machine trans. of A [kademiya] N [auk] SSSR. Doklady, 1963, v. 149, no. 2, p. 292-294.

Descriptors: (*Gyro stabilizers, Dynamics), (*Differential equations, Integration), Functions, Integrals, Equations, Motion, Momentum, Rotation, Moment of inertia, Gravity, Gyroscopes, USSR.

A heavy solid body, secured at one point was considered. It was assumed that with this body is connected a certain axis, around which can revolve a uniform flywheel. Taking the designation usual in solid body dynamics and designating by lambda, mu, and nu the projections of the angular momentum of the flywheel on a moving axis, an equation of motion for the considered solid (gyrostat) was written. Two particular cases of integrationability of these equations are indicated. The first case is connected with a Goryachev Chaplygin gyroscope, the second-with the Appelrot case.

9. Fluid Mechanics

AD-602 308 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF CALCULATION OF FLOW OF RAREFIED GAS,
by B. V. Kuksenko. 3 Jun 64, 10p
FTD MT64 114; TT 64 11843
Unclassified report

Edited machine trans. of A [kademiya] N[auk] SSSR. Doklady, 1963, v. 151, no. 5, p. 1042-1045.

Descriptors: (*Gas flow, Numerical analysis), (*One-dimensional flow, Equations), Molecules, Functions, Polynomials, Integral equations, USSR.

A method is indicated for constructing, proceeding from the integral equation f = V(f), systems of equations for many functions with small numbers of independent variables, whose detection is sufficient for the approximate solution of problems of aerodynamics of rarefied gases. In the particular case when a gas (model of molecule of which is an absolutely elastic smooth sphere) occupies the entire space and there are no streamlined bodies in it, such construction is carried to the end. A system of equations for one-dimensional non-stationary problems is presented. (Author)

AD-602 314 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THERMAL BARRIER WITH TURBULENT BOUNDARY LAYER OF GAS,
by S. S. Kutateladze and A. I. Leont'ev. 11 May 64 20p
FTD TT64 332; TT 64 11849
Unclassified report

Unedited rough draft trans. of Teplofizika Vysokikh Temperatur (USSR) 1963, v. 1, no. 2, p. 281-290.

Descriptors: (*Turbulent boundary layer, Thermal properties), Solids, Surface area, Fluid flow, Gases, High-temperature research, Thermodynamics, Heat transfer, Adiabatic gas flow, Partial differential equations, Numerical analysis, USSR.

An approximate method is given for calculating the thermal regime of a solid surface past which flows a turbulent, homogeneous, quasi-isothermal boundary layer with various methods of setting the thermal barrier. (Author)

AD-602 320 Div. 9, 30
OTS Prices: HC $12.00/MF $3.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROCEEDINGS OF THE ALL-UNION CONFERENCE ON THEORETICAL AND APPLIED MECHANICS [(NO. 1) HELD IN MOSCOW 27 JAN-3 FEB 1960],
by L. I. Sedov, ed. 18 May 64 886p
FTD TT63 471, TT 64 11855
Unclassified report

Unedited rough draft trans. of mono. Vsesoyuznyi S'ezd po Teoreticheskoi i Prikladnoi Mekhanike. Trudy, Moscow, 1962, 468p.

Descriptors: (*Symposia, Mechanics), (*Mechanics, Symposia), Gyroscopes, Machines, Dynamics, Motion, Stability, Fluid mechanics, Gas flow, Hydrodynamics, Aerodynamics, Magnetohydrodynamics, Liquids, Solids, Elasticity, Plasticity, Soil mechanics, USSR.

The work of the conference was carried out in three sections. The first section on general and applied mechanics includes: (1) Analytical mechanics and theory of motion stability; (2) gyroscopy, oscillations, and control; and (3) Theory of mechanisms and machines. The second section on fluid and gas mechanics includes: (1) General fluid mechanics; (2) aerodynamics and gasdynamics; (3) magnetohydrodynamics and the theory of unsteady gas motions; (4) motion of a viscous fluid, the boundary layer, turbulence, and heat transfer; (5) motion of liquids and gases in porous media; and (6) applied hydrodynamics. The third section on the mechanics of solids includes: (1) Theory of elasticity; (2) theory of plasticity and creep; (3) theory of plates and shells; (4) problems in dynamics; (5) soil mechanics; (6) structural mechanics; and (7) rheology.

AD-602 352 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

Boeing Scientific Research Labs., Seattle, Wash.
THE EQUILIBRIUM FLOW OF AN IDEAL DISSOCIATING GAS OVER A CONE,
by F. Edward Ehlers and Thomas A. Bray. Apr 64, 70p
D1 82 0350, Boeing Math 350
Unclassified report

Also available from the authors.

Descriptors: (*Hypersonic flow, Conical bodies), Gases, Dissociation, Equations of state, Motion, Shock waves, Shock (Mechanics), Specific heat, Thermodynamics, Flight, Integral equations, Differential equations, Statistical data. Programming (Computers), Gas flow.

The ordinary differential equations are derived for the axially-symmetric flow over a cone of the Lighthill ideal dissociating gas under thermodynamic equilibrium. By means of trigonometric transformations, the equations are simplified to forms containing only rational functions. The equations are integrated numerically by a fourth order Runge-Kutta method and a program listing in Fortran is included in the appendix. Tables of pressure, temperature, fraction of dissociation, and co-tangent of the local Mach angle on the solid cone boundary are tabulated for free flight at Mach numbers of 8, 10, 12, and 14 in an atmosphere of pure oxygen corresponding to altitudes of 20,063; 32,163; and 47,350 meters and for shocks having a tangent of the cone half angle varying from 0.4 to 1.22. The results are compared with calculations for the ideal perfect gas with a ratio of specific heats = 4/3. (Author)

AD-602 360 Div. 9
OTS Prices: HC $5.00/MF $1.00

Douglas Aircraft Co., Inc., Santa Monica, Calif.
SEPARATION AND REATTACHMENT OF SUPERSONIC TURBULENT BOUNDARY LAYER BEHIND DOWN STREAM FACING STEPS AND OVER CAVITIES,
by G. J. Thomke. Mar 64, 180p SM-43062
Unclassified report

Descriptors: (*Supersonic flow, Turbulent boundary layer), (*Turbulent boundary layer, Supersonic flow), Wake, Axially symmetric flow, Two-dimensional flow, Flow visualization, Barometric pressure, Distribution, Test methods, Tests, Wind tunnel models, Fluid mechanics.

Surface pressure measurements were obtained for the flow regimes created when a turbulent boundary layer in super-

SOLUTION OF AN ABLATION PROBLEM,
by M. L. Juncosa. Apr 64, 8p RM-4067PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Ablation, Mathematical analysis), Conical bodies, Wedges, Boundary layer, Geometric forms, Nose cones, Integral equations, Aerodynamic configurations.

AD-602 684 Div. 9
OTS Prices: HC $1.00/MF $0.50

Stanford Univ., Calif.
LINEARIZED THEORY OF TWO-DIMENSIONAL RADIATING GAS FLOW BY A MOMENT METHOD,
by Ping Cheng. Apr 64, 12p SUDAER 188
Contract AF49 638 1280
AFOSR 64 1002

Unclassified report

Descriptors: (*Gas flow, Two-dimensional flow), (*Numerical analysis, Special functions (Mathematical)), Differential equations, Transport properties, Potential theory, Moments, Fluid mechanics, Thermal radiation, Integral equations.

The author first lists the hydrodynamic equations for the three-dimensional time-dependent flow. This is followed by a discussion of the approximate radiation-transport equations. Finally, the linearized equations for two-dimensional steady flow are obtained.

AD-602 739 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems, Command, Wright-Patterson AFB, Ohio.
PROPAGATION OF STRONG EXPLOSION IN NON-HOMOGENEOUS ATMOSPHERE,
by E. L. Andryankin, A. M. Kogan, A. S. Kompaneets, and V. P. Krainov. [1963] 10p
FTD MT63 228; TT 64 71125

Unclassified report

[Edited machine] trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) 1962, no. 6, p. 3-7.

Descriptors: (*Shock waves, Propagation), (*Propagation, Shock waves), Explosions, Explosion effects, Mechanical waves, Hydrodynamics, Equations, Numerical analysis, USSR.

A hydrodynamic calculation was made of a strong explosion in a non-homogeneous atmosphere. It was found that after a finite period there occurs a departure of a shock front upward to infinity. It was shown that if the explosion is not strong, a strong shock wave cannot extend down to a distance greater than 16.5 km. The speed and pressure in the extending shock wave, depending upon time, was determined. Formulas of conversion into various energies and heights of explosion are given; the region of applicability of conversion is shown.

AD-602 769 Div. 9
OTS Prices: HC $3.00/MF $0.75

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SUMMARY REPORT ON AERODYNAMIC CHARACTERISTICS OF STANDARD MODELS HB-1 AND HB-2,
by J. Don Gray. Jul 64, 86p
Contract AF40 600 1000
AEDC TDR64 137

Unclassified report

Descriptors: (*Wind tunnel models, Aerodynamic characteristics), Hypersonic flow, Standards, Stability, Lift, Pressure, Heat transfer, Test facilities.

All available test data on the standard hypersonic ballistic correlation models, HB-1 and HB-2, were examined to establish reference characteristics for use in the correlation of experimental results among the various aerodynamic facilities. The data presented are comprised primarily of static stability and zero-lift forebody axial-force coefficient results at Mach numbers from about 1.5 to 20 for a Reynolds number range from 0.01 to 2700000 based on centerbody diameter. Selected pressure distribution, dynamic stability, and heat-transfer data are included. Comparisons of data from various test facilities show excellent correlation in spite of the appreciable Reynolds number dependence of test results for model HB-2 with natural boundary-layer transition. (Author)

AD-602 777 Div. 9, 2
OTS Prices: HC $2.00/MF $0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
FORCES ON A SPHERE ACCELERATING IN A VISCOUS FLUID.
Research rept.,
by Fuat Odar. Mar 64, 34p
Task 8S660200102
CRREL RR128

Unclassified report

Descriptors: (*Snow, Drift), (*Fluid mechanics, Spheres), (*Spheres, Force (Mechanics)), (*Force (Mechanics), Mathematical analysis), Fluids, Viscosity, Acceleration, Motion, Models (Simulations), Velocity, Measurement, Particles, Reynolds number, Precipitation, Simulation.

A study of the determination of the forces exerted by a fluid due to the relative velocity and acceleration of a sphere is presented, and previous work on rectilinear motion of bodies in a still fluid and the rectilinear motion of a fluid past fixed objects is reviewed. Experimental procedure, equipment, and tests are described. A formula is given for determining the resisting forces acting on a sphere moving rectilinearly in a viscous fluid, in terms of sphere radius, fluid density and viscosity, object velocity in the fluid, object acceleration, and force coefficients. The latter were determined experimentally by measuring the forces on a sphere moving sinusoidally within the range of 0 < Re (Reynolds number) < 62. (Author)

AD-602 789 Div. 9
OTS Prices: HC $2.00/MF $0.50

[Stanford Univ., Calif.]
A NUMERICAL EXPERIMENT WITH DISCRETE-VORTEX APPROXIMATION, WITH REFERENCE TO THE ROLLING UP OF A VORTEX SHEET,
by Hideo Takami. May 64, 26p
Contract AF49 638 1274
AFOSR 64 1292

Unclassified report

A portion of this document is illegible or non-reproducible.

Descriptors: (*Vortices, Numerical analysis), (*Numerical analysis, Vortices), Dynamics, Roll, Fluid flow, Incompressible flow, Equations, Motion, Integration, Programming (Computers), Experimental data, Graphics.

AD-602 564 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE AERODYNAMIC EFFECTIVENESS OF A DISCONTINUOUS SURFACE,
by V. K. Migai. 17 Apr 64, 12p
FTD MT63 237, TT 64 11932

Unclassified report

Edited machine trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1962, v. 5, no. 4, p. 20-24.

Descriptors: (*Diffusers, Fluid dynamic properties), (*Aerodynamics, Diffusers), Curved profiles, Surfaces, Effectiveness, Experimental data, Reynolds number, Fluid flow, Separation, Boundary layer transition, Ultrasonic radiation, Sound, Absorption, Flat plate models, Hydrodynamics, Steam turbines, USSR.

Results are given of an experimental investigation of effects arising during streamlining of a discontinuous surface. The discontinuous surface, by comparison with a smooth one, improves pressure distribution considerably. (Author)

AD-602 581 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IN REFERENCE TO A NONLINEAR THEORY OF AERODYNAMIC STABILITY,
by V. V. Struminskii. 5 May 64, 12p
FTD MT64 07, TT 64 11952

Unclassified report

Edited machine trans. of A[kademiya] N[auk] SSSR. Doklady, 1963, v. 151, no. 5, p. 1046-1049.

Descriptors: (*Fluid flow, Theory), (*Laminar flow, stability), Boundary layer, Turbulence, Reynolds number, Nonlinear differential equations, Functions, Differential equations, Hydrodynamics, Aerodynamic characteristics, USSR.

For the purpose of investigating the problem of aerodynamic stability, application is made of the method of successive approximations -- the method of small parameter. The first order of approximation coincides with the usual linear theory. For subsequent approximations, a recurrence system of ordinary differential equations is obtained. It is shown that the boundary of stability and character of change of perturbations in time for successive approximations are determined by the linear approximation. (Author)

AD-602 583 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MEASUREMENT OF COMPONENTS OF SPEED OF PULSATION BY A SINGLE-FILAMENT THERMO-ANEMOMETER,
by V. V. Skobunov. 17 Apr 64, 11p
FTD MT63 341, TT 64 11954

Unclassified report

Edited machine trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1962, v. 5, no. 12, p. 23-26.

Descriptors: (*Gas flow, Oscillation), (*Anemometers, Operation), Measurement, Turbulence, Voltage, Resistance (Electrical), Equations, Fluid flow, Heat transfer, Amplifiers, Temperature, Heat sensitive elements, USSR.

Methods are described for measuring fluctuation velocity components in a turbulent air flow by means of a single hot-wire anemometer VEY with dependent resistance. (Author)

AD-602 597 Div. 9, 10
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ATOMIZATION OF A LIQUID IN A SUPERSONIC FLOW,
by M. S. Volynskii. 6 Dec 63, 18p
FTD MT63 186; TT 64 11968

Unclassified report

Edited machine trans. of A[kademiya] N[auk] USSR. O[tdelenie] T[ekhnicheskikh] N[auk]. Izvestiya: Mekhanika i Mashinostroenie, 1963, no. 2, p. 20-27.

Descriptors: (*Atomization, Supersonic flow), (*Supersonic flow, Atomization), Liquids, Fuels, Fuel injection, Combustion, Jet engines, Fluid flow, Test methods, Spark shadowgraph photography, Equations, Mathematical analysis, USSR.

The development of the process of combustion in a high temperature supersonic flow is determined by the quality of the fuel atomization, in the engine atomization, evaporation, and mixing. The results of a study of the form of the torch of atomization and also the scale of the atomization in a supersonic flow are presented. An examination of the process of atomization is conducted within the frame work of an aerodynamically posed problem without a computation of the heat transfer and phase transitions (evaporation, dissociation etc.) It is assumed that disintegration of the liquid occurs very rapidly and the heat phenomena (in a number of cases do not succeed in influencing substantially the initial diameter of the particles (which later on, of course, are subject to evaporation).

AD-602 623 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

California Inst. of Tech., Pasadena.
STABILITY OF HELIUM II FLOW DOWN AN INCLINED PLANE,
by Din-Yu Hsieh. Jul 64, 22p, CIT 85 28
Contract Nonr220 28

Unclassified report

Descriptors: (*Helium, Fluid flow), (*Liquefied Gases, Helium), Cryogenics, Hydrodynamics, Stability, Perturbation theory, Friction, Boundary layer, Films.

The stability of a layer of helium II flowing down an inclined plane is investigated on the basis of the two fluid theory. The expression of mutual friction as suggested by Gorter and Mellink is used in the analysis. In the limit that essentially only the normal fluid is present, the Yih-Benjamin result is recovered. A similar stability criterion holds for the limit that essentially only the super fluid is present. In general, the flow system is stable only when the fluid layer is fairly thin. Then the system may be stable for certain intermediate compositions even when the fluid is flowing down the underside of the plane. The results may have some bearing on the problem of film flow in superfluid helium. (Author)

AD-602 647 Div. 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.

convergence. Effects of structural damping and below-flutter response are also examined. It is shown that below certain critical values of mass density ratio mv, flutter does not occur. Also, at the lower values of mv, increasing the sweepback of a given wing lowers the flutter speed significantly until a critical angle is reached beyond which the flutter speed rises sharply to infinity. The mode shapes at flutter change from a standing wave type at high values of mv to a traveling wave type at low mv. Quasi-steady theory is generally unconservative in flutter speed when compared with complete unsteady theory. (Author)

AD-602 833 Div. 9, 17, 30
OTS Prices: HC $5.00/MF $0.50

Hydronautics, Inc., Laurel, Md.
CAVITATION DAMAGE,
by Phillip Eisenberg. Dec 63, 162p Hydro TR233 1
Contract Nonr 3755, Proj. NR062 293
Unclassified report

Descriptors: (*Cavitation, Damage), (*Hydrodynamics, Cavitation), Damage control, Metallurgy, Electrochemistry, Scale, Corrosion, Materials, Mechanical properties, Protective treatments, Test facilities, Economics, Scientific research.

Contents:
The hydrodynamics of cavitation
Mechanisms of cavitation damage
Correlation of material properties and susceptibility to cavitation damage
Methods of protection against cavitation damage nature and types of protection
Experimental facilities and methods in cavitation damage research

AD-602 867 Div. 9
OTS Prices: HC $1.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
A STUDY OF THE IMPULSIVE MOTION OF A SEMI-INFINITE FLAT PLATE USING A LINEAR MODEL OF THE UNSTEADY BOUNDARY LAYER EQUATIONS,
by Robert C. Ackerberg. Dec 63, 23p PIBAL 821
Grant AF AFOSR1 63, Proj. 9781 01
Unclassified report

Descriptors: (*Flat plate models, Motion), (*Boundary layer, Equations), Boundary value problems, Fluid mechanics, Mathematical models, Partial differential equations, Integral transforms, Theorems.

The impulsive motion of a semi-infinite flat plate in a fluid initially at rest is studied using a linear model of the unsteady boundary layer equations (introduced by Stewartson) and conventional Fourier and Laplace transform techniques. By imposing the physical condition that the skin friction be integrable at the leading edge, a unique solution is found which agrees with that obtained by Stewartson using a different method. All transforms are inverted in a formal way using a theorem on Laplace transforms due to Van der Pol, and the non-unique solutions are discussed. (Author)

AD-602 891 Div. 9
OTS Prices: HC $2.00/MF $0.50

Defense Research Lab., Univ. of Texas, Austin.
A STUDY OF THE EFFECT OF FLOATING-ELEMENT MISALIGNMENT ON SKIN-FRICTION-BALANCE ACCURACY,
by Francis B. O'Donnell, Jr. 3 Mar 64, 54p
DRL 515; DRL-CR-10
Contract NOrd-16498, Task UTX-2
Unclassified report

Descriptors: (*Turbulent boundary layer, Shear stresses), (*Shear stresses, Measurement), Surfaces, Wind tunnels, Reynolds number, Drag, Experimental data, Misalignment, Fluid dynamic properties, Laboratory equipment, Aerospace craft.

An experimental investigation was made of the effect of operating a floating-element-type skin friction balance with the element misaligned in the test surface. The misalignment consisted of mounting the element parallel to the test surface, but recessed below or projecting above the surface. A drive mechanism was constructed which permitted traversing the balance and its element through a range of approximately 0.003-in. of recess to 0.003-in. of projection. The effect of misalignment on balance output was determined in a continuous-flow wind tunnel over a Mach Number range of 1.73 to 3.55, at several Reynolds Numbers. The results indicated that any degree of misalignment resulted in a change of balance output. This error in output was slightly larger for the case of a projecting element than for the recessed-element case. No consistent correlation between misalignment error and either Mach Number or Reynolds Number was found. (Author)

AD-602 905 Div. 9
OTS Prices: HC $3.00/MF $0.75

Brown Engineering Co., Inc., Huntsville, Ala.
FLOW FIELD CALCULATIONS AROUND A YAWED RIGHT CIRCULAR CONE,
by J. L. Diven. Aug 63, 70p BrownEng R67
Unclassified report

Descriptors: (*Programming (Computers), Hypersonic flow), (*Conical bodies, Hypersonic characteristics), Numerical analysis, Gas flow, Yaw, Angle of attack, Specific heat, Shock waves, Fluid mechanics.

A FORTRAN program was written to calculate the flow field about a yawed right circular cone. The program inputs are angle of attack, cone half-angle, free stream Mach number, ratio of specific heats, the number of steps to be taken around the body, and the number of steps to be taken between the body surface and the shock wave. The three velocity components, pressure, density, and non-dimensional entropy at the shock wave, body surface, and intermediate points in the flow field are obtained as a function of the peripheral angle. The program was written in FORTRAN IV for the IBM 7040 computer and may be obtained from the Brown Engineering Company, Scientific Programming Section as Program Number SP 82. (Author)

AD-602 922 Div. 9, 14, 25
OTS Prices: HC $2.00/MF $0.50

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EVALUATION OF POROUS MATERIALS AS MOLECULAR LEAKS,
by A. J. Mathews. Jul 64, 44p
Contract AF40 600 1000, Proj. 8951, Task 895104
AEDC TDR64 94
Unclassified report

Descriptors: (*Gas flow, Measurement), (*Porous materials, Transport properties), (*Transport properties, Porous materials), Glass, Bronze, Stainless steel, Tests,

In view of the criticism against the idea of approximating a real vortex sheet by a row of discrete vortices in an inviscid fluid, the rolling up of a vortex sheet studied by Westwater is reexamined. By means of a simple numerical computation, it is shown that strong randomization of the vortices takes place near the tip of the sheet in contrast to Westwater's previous computation. The same approximation is applied also to some other vortex sheets of similar kind. The distribution of vortices becomes irregular in every case and the 'discrete-vortex approximation' does not seem to give a detailed picture of the behavior of the original continuous sheet. The equations of motion of vortices is seen to be unstable with respect to the initial data. (Author)

AD-602 795 Div. 9
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif. Div. of Engineering Mechanics.
USE OF HYDROGEN BUBBLES FOR QUANTITATIVE DETERMINATION OF TIME DEPENDENT VELOCITY FIELDS IN LOW SPEED WATER FLOWS,
by F. A. Schraub, S. J. Kline, J. Henry, P. W. Runstadler, Jr., and A. Littell.
Feb 64, 66p MD-10
Contract AF49 638 1278, Grant NSF G14535
AFOSR 64 1278

Unclassified report

Descriptors: (*Fluid mechanics, Flow visualization), Fluid flow, Water, Velocity, Determination, Hydrogen, Bubbles, Hydrodynamics, Numerical analysis, Differential geometry.

Improved flow visualization methods based on the hydorogen bubble technique are described. Use of 'combined-streak markers' allows quantitative measurement of the instantaneous velocity field in a plane as a function of time in low speed water flows. Adaptation to a great variety of situations using different probe techniques is possible. Disturbance to the flow is very small. Adequate accuracy is obtainable. The method offers the advantage of simultaneous visual images of the flow structure and quantitative measurement of velocity over a finite region. It also allows some types of measurements not previously possible. Limitations of the method include its restriction to low speed water flows and the observation of fluctuations only at low frequencies. Practical difficulties occur due to probe frangibility and problems of uniform bubble production. Part I describes the underlying concepts, summarizes the history of the method and describes operating experience to date at Educational Services, Incorporated and Stanford University. Part II is a detailed analysis of the uncertainties in velocity measurements using combined-time-streak markers formed by hydrogen bubbles. (Author)

AD-602 796 Div. 9
OTS Prices: HC $2.00/MF $0.50

Technische Hochschule, Stuttgart (West Germany).
EXPERIMENTAL INVESTIGATIONS OF VORTEX OCCURRENCE AT TRANSITION IN UNSTABLE LAMINAR BOUNDARY LAYERS.
Final rept.,
by Franz X. Wortmann. 10 Feb 64, 47p
Contract AF61 052 220
AFOSR 64 1280

Unclassified report

A portion of this document is illegible or nonreproducible.

Descriptors: (*Laminar boundary layer, Vortices), Fluid flow, Boundary layer transition, Stability, Theory, Flow visualization, Tellurium, Photographic analysis, Water tunnels, West Germany.

The behavior of laminar and instably stratified boundary layers towards three-dimensional perturbations, in form of vortices parallel to the direction of flow, was investigated by means of a water tunnel of very low turbulence. The theory of stability of such vortex perturbations in boundary layers may be of fundamental significance for the origin of turbulence. The artificially created vortex perturbations were photographically recorded by means of the tellurium method. For the first time it has been possible to verify the theoretically stated neutral curve of stability. Furthermore the distribution of the disturbation amplitude for different wave lengths and wall distances and also the growth of the vortices in the direction of flow were investigated. These experiments also give a verification of the theory of stability and show at the same time that the validity of the theory is limited to small disturbation amplitudes. (Author)

AD-602 824 Div. 9, 15
OTS Prices: HC $1.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md.
A THEORY OF SMALL-AMPLITUDE LONG WAVES.
Technical rept. nos. 16 and 19,
by Robert R. Long. Jun 64, 24p
Contract Nonr4010 01, Grant WBG21, Proj. NR082 104

Unclassified report

Descriptors: (*Water waves, Hydrostatics), (*Hydrostatics, Water waves), Theory, Differential equations, Integration, Boundary vlave problems, Fluid mechanics, Mathematical analysis.

A theory of small-amplitude, long, water waves is developed by expansion in terms of the two small parameters involved. The first approximation is required to be the familiar equations of infinitesimal, long waves. An investigation is made of the accuracy of the classical equations of finite-amplitude, hydrostatic disturbances. It appears that the simple hydrostatic approximation neglects terms which are just as important as those retained, although in certain cases the equations of hydrostatic disturbances may be useful to predict developments for limited periods of time. The first few sets of differential equations are integrated in a special case. The study leads to the derivation of the properties of a new kind of finite-amplitude, long wave. (Author)

AD-602 830 Div. 9
OTS Prices: HC $4.00/MF $0.75

Fluid Dynamics Research Lab., Mass. Inst. of Tech., Cambridge.
PURE BENDING FLUTTER OF A SWEPT WING IN A HIGH DENSITY, LOW SPEED FLOW,
by John Dugundji and Nancy Ghareeb. Mar 64, 102p
FDRG 64 1
Contract Nonr1841 81, Proj. S R009 01 01

Unclassified report

Descriptors: (*Swept wings, Flutter), (*Flutter, Theory), Velocity, Gas flow, Lift, Deflection, Aerodynamic characteristics, Functions, Differential equations, Partial differential equations, Damping, Pressure, Boundary layer, Aeroelasticity.

The pure bending flutter of a uniform, high aspect ratio, swept wing is studied in detail. Velocity component aerodynamic strip theory is used with both quasi-steady and unsteady Theodorsen function representations. The problem is non-dimensionalized, and exact solutions are obtained, thereby eliminating problems of modal

10. Fuels and Combustion

AD-602 461 Div. 10, 32
OTS Prices: HC $6.00/MF $1.25

Committee on Fire Research, NAS-NRC, Washington, D. C.
DIRECTORY OF FIRE RESEARCH IN THE UNITED STATES,
ed. by Walter G. Berl. 1964, rev. 1963, 221p
NAS-NRC 1189

Unclassified report

Descriptors: (*Fires, Scientific research), (*Fire safety, Scientific research), (*Abstracts, Fires), Propellants, Fuels, Directories, Meteorology, Fire extinguishers, Documentation, Flammability, Explosive materials, Forest fires, Electrical equipment, Auto-ignition, Combustion, Control, Petroleum, Powders, Bibliographies, Explosions, Fluids, Greases, Atomization.

AD-602 481 Div. 10, 1, 12
OTS Prices: HC $1.00/MF $0.50

Bureau of Mines, Pittsburgh, Pa.
REVIEW OF FIRE AND EXPLOSION HAZARDS OF FLIGHT VEHICLE COMBUSTIBLES.
Annual rept. no. 4, Apr 63-Mar 64,
by Henry E. Perlee, Elton L. Litchfield and Michael G. Zabetakis. Jun 64, 24p
Contract AF33 616 60 8, Proj. 6075, Task 607504
ASKD TR61 278 S3

Unclassified report

Descriptors: (*Aviation fuels, Hazards), (*Rocket propellants, Hazards), (*Rocket oxidizers, Hazards) Combustion, Detonations, Inhibition, Ignition, Deflagration, Oxygen, Hydrogen, Aviation fires, Autoignition, Aircraft, Halogenated hydrocarbons, Flammability, Guided missiles, Methane, Methyl radicals, Chlorides, Liquified gases, Solidified gases, Fuels.

This report is on the fire and explosion hazards associated with combustibles and other gases likely to be found in aircraft and missile systems. It presents experimental results pertinent to inhibition of gaseous detonation, ignition of solid oxygen-liquid hydrogen mixtures, and flammability characteristics of halogenated hydrocarbons. The halogenated hydrocarbons do not appear to be particularly effective inhibitors of gaseous hydrogen-oxygen detonation. Combustibles such as methane and hydrogen were found to be superior to the halogenated hydrocarbons on a weight basis. Cryogenic mixtures of solid oxygen and liquid hydrogen can be ignited by 0.5-ounce projectiles moving at speeds as low as 1310 ft/sec (400 meters/sec). Ignition appears to occur at shock strengths of 1.5 to 3.0 kilobars. Although the halogenated hydrocarbons considered here do not appear to be flammable in air at atmospheric pressure and ordinary temperatures, some are flammable in oxygen under these conditions. Flame speeds and maximum explosion pressures associated with the flammable mixtures were found to be considerably lower than those of the corresponding hydrocarbon-oxygen mixtures. (Author)

AD-602 504 Div. 10, 22
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
A STUDY OF THE FUNDAMENTALS OF LIQUID PROPELLANT SENSITIVITY.
Technical progress rept. no. 2,
by Ted Erikson. 10 Mar 64, 24p IITRI C6024 8
Contract AF04 611 9566
AD 437 384

Unclassified report

Descriptors: (*Liquid rocket propellants, Detonations), (*Detonations, Explosive materials), (*Sensitivity, Explosive materials), (*Explosive materials, Detonations), Lead compounds, Azides, Shock tubes, Shock waves, Low-temperature research, Nitrogen, Air, Light, Temperature, Pressure, Test equipment.

Preliminary sensitivity tests of lead azide samples, with initial temperatures to -170C, have been performed in the new cryogenic IITRI shock-tube facility. Detonations were generally identified within 200 microseconds of the time that incident Mach 2.6 nitrogen shocks were reflected from the surface of the sample. Two characteristic induction periods were noted. The first period can be considered typical. The second period exhibited an increasing light output which stabilizes. Subsequent light output jumps instantaneously and work output follows within 10 to 30 microseconds. An appreciable sensitivity increase was identified with traces of air (oxygen) in the driven gas and lowered initial azide sample temperatures of 200C; at otherwise constant conditions time delays decreased by factors of 10 and 2, respectively. (Author)

AD-602 531 Div. 10, 12
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
SOLID PROPELLANT MECHANICAL PROPERTIES INVESTIGATIONS.
Quarterly progress rept. no. 1 (Rept. no. 3), 1 Oct 63-1 Jan 64,
by Norman Fishman and James A. Rinde. 20 Jan 64, 21p
Contract AF04 611 9559, continuation of Contract AF04 611 8388, Proj. PRU4673

Unclassified report

Descriptors: (*Solid rocket propellants, Mechanical properties), Stresses, Strain (Mechanics), Loading (Mechanics), Equations of state, Dilatometers, Butadienes, Aluminum, Powder metals.

Progress was made toward the development of a method for defining the path-independent physical state of a propellant in terms of stress-strain-time history. The applicability of an 'equation of state' to constant strain rate and constant load test results is demonstrated by comparison of calculated and experimental test data at three temperatures. The air dilatometer was modified to extend the range of loads available for constant load testing, to provide the added capability for recovery at zero load, and to carry out constant loading rate tests. Two model systems for future study were formulated; both were based on the carboxy-terminated polybutadiene binder used in the propellants, with glass beads or aluminum powder used as filler. Preliminary tests under conditions of constant loading rate, constant strain rate cycling, and constant load recovery were undertaken and results are reported. (Author)

AD-602 592 Div. 10
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONCERNING THE METHODOLOGY OF EXPERIMENTAL INVESTIGATION OF THE TOTAL KINETICS OF COMBUSTION OF GASES,
by Z. S. Leont'eva. 30 Mar 64, 12p
FTD MT63 238, TT 64 11963 Unclassified report

Adsorption, Pressure, Vacuum, Environmental tests, Nitrogen, Conductivity, Molecular properties, Kinetic theory.

From the experimental results obtained, adsorption effectively makes Knudsen's flow theory inadequate for predicting the conductance of a molecular leak. This necessitates calibrating the molecular leak for each gas or vapor that will be used. Of the four types of leaks tested, porous glass and porous stainless steel offer the best possibilities for use as molecular leaks at relatively high pressures (100-760) TORR). A leak fabricated from porous glass exhibits molecular flow up to atmospheric pressure. For a conductance of 0.00001 liters/sec for N2, the over-all length of the leak is approximately 8 in. with an OD of 15/32 in. The leak is easily contaminated and has a great affinity for water vapor and other vapors. It is difficult to mount and easily broken.

AD-602 977 Div. 9
OTS Prices: HC $2.00/MF $0.50

Virginia Univ., Charlottesville.
DISTRIBUTION FUNCTION MEASUREMENTS IN RAREFIED GAS FLOW THROUGH AN ORIFICE,
Technical rept.
by John E. Scott, Jr., Harold S. Morton, Jr., John A. Phipps, and John F. Moonan. Jul 64, 35p UVA 5P
Contract Nonr3623 00, Proj. NR098 038
Unclassified report

Presented at the International Symposium on Rarefied Gas Dynamics (4th), Toronto Univ., 14-17 Jul 64. Proj. Squid, a cooperative program of basic research relating to Jet Propulsion.

Descriptors: (*Helium group gases, Gas flow), (*Gas flow, Dynamics), (*Fluid mechanics, Statistical functions), (*Orifices, Transport properties), Experimental data, Argon, Xenon, Molecular beams, Aerodynamic characteristics.

Distribution functions in argon and xenon beams that were formed by effusion through a plane orifice have been measured over a range of source density levels corresponding to source Knudsen numbers from 10 to 0.1. For source Knudsen numbers greater than about 5, it was not possible to detect directly the dependence of the differential beam intensity on source Knudsen number; i.e., departures from the Maxwell-Boltzmann distribution function corresponding to the 'collisionless limit' were within the experimental error. As the source density is increased, the most probable beam speed is observed to increase and the width of the distribution is observed to decrease. These effects, which are recognizable as the beginning of a trend away from free molecular flow toward continuum or aerodynamic flow through the source orifice, are clearly evident even when the source Knudsen number is as large as 3. The experimentally measured beam speed distributions are compared with distributions calculated by solving the Boltzmann equation along the beam axis in an approximate manner using the BGK relaxation time model for the collision term. The approximate theory is in qualitative agreement with the experimental results for source Knudser numbers of order unity. (Author)

facility for the consolidation of technical information relating to mechanical behavior and structural integrity analysis.

AD-602 776 Div. 10, 4, 12
OTS Prices: HC $2.00/MF $0.50

Malker Labs. Inc., High Bridge, N. J.
KINETIC STUDY OF ROCKET EXHAUST GASES.
Progress rept. no. 9 for period ending 16 Jul 64.
16 Jul 64, 32p Malaker 103 9
Contract DA30 0690RD2918, Proj. 1A22901A211
Unclassified report

A portion of this document is nonreproducible.

Descriptors: (*Exhaust gases, Reaction kinetics), (*Rocket propellants, Combustion), (*Exhaust flames, Images), Heat of reaction, Temperature, Catalysts, Spectroscopy, Photographic analysis, Photographic techniques.

A study was made of spectrally resolved flame images. Flame temperatures were determined using the monochromatic photography technique. Both studies involved two propellant formulations designated by Picatinny Arsenal.

AD-602 888 Div. 10, 9, 25, 2[illegible]
OTS Prices: HC $5.00/MF $1.00

Pennsylvania State Univ., University Park.
SPONTANEOUS IGNITION DURING CHARGING PROCESSES IN PNEUMATIC AND HYDRAULIC SYSTEMS,
by G. M. Faeth and W. E. Meyer. Oct 63, 192p
Contract NObs78674
Unclassified report

Descriptors: (*Autoignition, Hydraulic fluids), Ignition, Fluids, Hydraulic systems, Pneumatic systems, Compressed air, Pressure, Temperature, Gases, Thermodynamics, Fluid mechanics, Tests, Experimental data, Graphics.

This report deals with the ignition of hydraulic fluids by means of compression processes caused by rapid pressurization of air filled portions of hydraulic and pneumatic systems. A theoretical analysis of the gas temperatures attained during the compression process is presented. Employing this analysis a reasonable correlation was obtained between the experimental conditions under which ignition would occur during a compression process and the spontaneous ignition temperatures of the hydraulic fluid. Further analytical studies were made of the parameters which affect the rate of compression during rapid venting of high pressure air or liquid into a pipe containing air at low pressure. The predicted pressure rise rates and maximum pressures were found to be in fair agreement with the experimental results. (Author)

11. Ground Transportation Equipment

No Entries

Edited machine trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1960, v. 3, no. 2, p. 12-16.

Descriptors: (*Combustion, Gases), (*Carbon compounds, Monoxides), (*Combustion products, Reaction kinetics), Experimental data, Temperature, Mixtures, Transformations, USSR.

The suggested methodology is based on the rapid mixing of a gas mixture with the products of combustion during the creation of a sufficiently uniform field of temperatures and concentrations and almost isothermal conditions of transformation. An experimental check on a sample of carbon monoxide in the temperature interval 1000-1250C showed conformity with reliable literary data. (Author)

AD-602 609 Div. 10, 25
OTS Prices: HC $6.00/MF $1.50

Linde Div., Union Carbide Corp., Tonawanda, N. Y.
THEORETICAL, EXPERIMENTAL, AND ANALYTICAL EXAMINATION OF SUBCOOLED AND SOLID HYDROGEN.
Final rept. for 15 Nov 62-15 Dec 63,
by R. R. Carney, R. F. Dwyer, H. M. Long, and L. R. Niendorf. May 64, 272p
Contract AF33 657 10248, Proj. 8169, Task 816901
APL TDR64 22

Unclassified report

Descriptors: (*Slurry fuels, Hydrogen), (*Hydrogen, Cryogenics), Solidified gases, Liquefied gases, Mixtures, Production, Feasibility studies, Costs, Cooling, Vacuum pumps, Helium, Injection, Propellant tanks, Storage, Vapor pressure, Solubility, Diffusion, Fluid flow.

Methods were investigated, both theoretically and experimentally, for production of liquid-solid mixtures of hydrogen ('hydrogen slush'). Small scale experiments were conducted to determine the feasibility of a number of techniques; the practicability and costs for these methods were determined theoretically. The theoretical analyses showed that techniques for producing hydrogen slush by vacuum pumping appeared most practical in view of capital investment and operating costs. Injection of cold helium gas was determined to be the most promising method for upgrading the solid content of slush mixtures after transfer to flight vehicle tankage. The theoretical analyses were verified within expectable error by large scale experiments in a low heat leak apparatus that permitted visual observation of experiments through a periscopic device. Liquid-solid hydrogen mixtures were produced having solid contents ranging from 20 percent to 55 percent. A number of characteristics were noted which varied with the production techniques used and with attempts to upgrade the quality of the slush produced. Some mixtures were flowable, and others were not. (Author)

AD-602 742 Div. 10, 30
OTS Prices: HC $2.00/MF $0.50

Southern Forest Fire Lab., Macon, Ga.
AN EXPERIMENTAL STUDY OF MODEL FIRES.
Technical rept. no. 3.
by G. M. Byram, H. B. Clements, E. R. Elliott, and P. M. George. 29 Jun 64, 50p
Contract DCM SR59 10

Unclassified report

Descriptors: (*Fires, Flame propagation), Models (Simulations), Forest fires, Meteorological parameters, Wind, Wind tunnels, Tests, Test methods, Fuels, Burning rate, Convection, Gas flow, Ignition, Wood, Temperature.

The first part of the report presents the results of tests of fires in wood cribs. In one series of tests cribs of the same height and structure but with different areas, or horizontal cross-sections, were burned in still air to determine the effect of size of burning area on the rate of burning per unit area. A second group of tests in still air concerns the effect of stick size and spacing on rate of fire spread. A third series of tests was made with fires in the wind tunnel to determine the effect of wind speed on rate of spread, rate of heat output, flame length, and angle of flame tilt. Although a quantitative model of fire propagation is not proposed, the second part of the report deals with mechanisms of fire spread. An experiment with a series of pool fires in a wind stream is described which illustrates an important ignition process involved in the spread of wind-driven fires.

AD-602 753 Div. 10, 14, 27
OTS Prices: HC $1.00/MF $0.50

Keck (W. M.) Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
A RESEARCH PROGRAM ON SOLID PROPELLANT PHYSICAL BEHAVIOR.
Quarterly rept. no. 3, 1 Feb-30 Apr 64,
by M. L. Williams. May 64, 8p MATSCIT-PS64 2
Contract AF04 611 9572

Unclassified report

Descriptors: (*Solid rocket propellants, Physical properties), Scientific research, Research program administration, Rubber, Vulcanizates, Mechanical properties, Electrical properties, Free radicals, Polymerization, Reaction kinetics, Materials, Standards, Experimental data, Documentation Rocket motors (Solid propellant), Propellants.

Contents:
Mechanical Behavior of Gum Rubber Vucanizates
Electrical Behavior of Gum Rubber Vulcanizates
Kinetics of Free Radical Polymerization
Standardized Material Characterization
Data Information facility.

AD-602 754 Div. 10, 14, 27
OTS Prices: HC $1.00/MF $0.50

Keck (W. M.) Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
A RESEARCH PROGRAM ON SOLID PROPELLANT PHYSICAL BEHAVIOR.
Quarterly rept. no. 1, 1 Nov 63-31 Jan 64,
by M. L. Williams. Feb 64, 9p MATSCIT-PS64 1
Contract AF04 611 9572

Unclassified report

Descriptors: (*Solid rocket propellants, Physical properties), Research program administration, Scientific research, Propellants, Polymers, Composite materials, Materials, Standards, Experimental data, Documentation, Rocket motors (Solid propellant).

The purpose of this research is to initiate and maintain an integrated program directed toward providing increased understanding of solid propellant physical behavior, and application of this understanding to analysis of solid rocket motors. The major emphasis therefore will be to supplement existing knowledge in the areas of material behavior of polymeric and composite systems, and the refinement of solid rocket structural analysis procedures. There are also two related subsidiary objectives. First, it is believed desirable to investigate the feasibility of generating basic physical and mechanical property data for one or more 'standard' cross-linked materials. Second, it is the intent to establish and maintain a library

Descriptors: (*Space stations, Stability), (Structures, Aeroelasticity), Rotation, Aerodynamic configurations, Damping, Jets, Oscillation, Airspeed, Flight paths, Torque, Couplings, Force (Mechanics), Design, Equations, Mathematical analysis, Performance (Engineering), Manned.

A basic investigation of the effects of structural flexibility of the rotating space station concept in terms of system stability is presented. The results of the analyses were formed into general stability criteria using the fundamental characteristics of the space station system. The criteria show the relationship between applied forces, configuration flexibility and configuration damping and are presented in a manner suitable for preliminary analysis of future design concepts. For design values of current space station concepts using spin-up jets and wobble rate damper systems and for the assumptions used in the analyses, the stability criteria indicate that no instability of the flexible modes should be encountered. (Author)

AD-602 555 Div. 12
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A METHOD OF APPROXIMATION FOR CALCULATING THE ORBITS OF SPACE ROCKETS,
by I. Almar, B. Balazh, and K. Tot. 30 Dec 63, 31p
FTD MT63 198; TT 64 11923

Unclassified report

Edited machine trans. of [Akademiya Nauk SSSR]. Institut Teoreticheskoi Astronomii. Byulleten', 1962, v. 8, no. 6[99] p. 405-420.

Descriptors: (*Orbital trajectories, Numerical analysis), Nomographs, Partial differential equations, Satellites (Artificial), USSR.

AD-602 559 Div. 12
OTS Prices: HC $4.00/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ROCKETS AND INTERPLANETARY FLIGHTS,
by B. V. Lyapunov. Jun 63, 143p
FTD TT63 210; TT 64 11927

Unclassified report

Unedited rough draft trans. of mono. Rakety i Mezhplanetie Polety, Moscow, 1962, 122p.

Descriptors: (*Rockets, Space flight), (*Manned spacecraft, Interplanetary trajectories), Moon, Venus, Satellites (Artificial), Solar systems, Astronautics, Orbital trajectories, Space communication systems, Space navigation, USSR.

In his book 'Rockets and Interplanetary Flights', engineer B. V. Lyapunov expounds in easily accessible terms the achievements of modern science and technology in the conquest of space, and examines the outlook on future space flights. The book gives a detailed account of Soviet artificial earth satellites, space rockets and space ships, on the flights to the moon and the Venus. A separate chapter is devoted to the unparallelled flights, first in the world, by Soviet astronauts Major Yu. A. Gagarin and Major G. S. Titov. Considerable space is also devoted to the works of Soviet scientists, and to the work of the founder of astronautics, K. E. Tsiolkovskiy. The book is compiled from materials published in the domestic and foreign press. (Publisher's note)

AD-602 571 Div. 12
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PECULIARITIES OF DYNAMIC WEIGHTLESSNESS,
by V. Selyakov. 15 Jun 63, 11p
FTD MT63 19; TT 64 11939

Unclassified report

Machine trans. of Aviatsiya i Kosmonavtika (USSR) 1963 [v. 4[no. 1, p. 16-19.

Descriptors: (*Space environmental conditions, Weightlessness), (*Weightlessness, Space environmental conditions), Gravity, Velocity, Acceleration, Rotation, High altitude, Motion, Earth, Moon, Sun, Rockets, Satellites (Artificial), USSR.

The weightlessness phenomenon is discussed in terms of the rectilinear movement of high-altitude rockets and the circular movement of oriented satellites.

AD-602 593 Div. 12, 9
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE TRANSITION OF A SPACE VEHICLE, BRAKED IN THE ATMOSPHERE OF A PLANET, INTO THE ORBIT OF AN ARTIFICIAL SATELLITE [AND] AXIALLY SYMMETRIC OSCILLATIONS OF CYLINDRICAL SHELLS IN SUPERSONIC FLOW OF GAS,
by V. A. Il'in and K. K. Livanov. 13 Feb 64, 26p
FTD MT63 220; TT 64 11964

Unclassified report

Edited machine trans. of Inzhenernyi Zhurnal (USSR) 1963, v. 3, no. 2, p. 203-206, 322-330.

Descriptors: (*Spacecraft, Atmosphere entry), (*Cylindrical bodies, Oscillation), Satellites (Artificial), Circular orbit trajectories, Velocity, Integrals, Deceleration, Differential equations, Functions, Frequency, Fluid dynamic properties, Stresses, Supersonic flow, Boundary value problems, Axially symmetric flow, USSR.

The transition of a cosmic vehicle entering the atmosphere with a speed greater than the escape velocity from braking ellipses into the circular orbit of an artificial satellite of the planet. It is shown that the minimum thrust, necessary for the transition is achieved when it is imparted at the moment of contact to the braking ellipse of a given circular orbit in the apoaster. A simple formula is obtained for determination of the optimum increase of speed during transition as a function of the height of the circular orbit. (Il'in). A method is given of investigating axially symmetric oscillations of cylindrical shell, making it possible to obtain an accurate solution of problem with a consideration of forces of inertia of all displacements. The method is discussed in reference to general equations of theory of shells which does not consider inertia of displacement. (Livanov)

AD-602 608 Div. 12, 30
OTS Prices: HC $7.00/MF $1.50

RCA Defense Electronic Products, Burlington, Mass.
ADAPTION FOR SPACE VEHICLES THROUGH ON-BOARD DIGITAL COMPUTER CONTROL.

12. Guided Missiles

AD-602 340 Div. 12
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ROCKETS IN ORBIT,
by B. Trofimov. 27 May 64, 10p
FTD TT64 536, TT 64 11866

Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, 15 Apr, p. 1.

Descriptors: (*Rockets, Military satellites), (*Bombardment satellites, Reviews), Rocket trajectories, Orbital trajectories, Guided missiles (Air to surface), Velocity, USSR.

Rockets in orbit: Soviet views on U. S. progress in the field of orbital rocket weapons.

AD-602 356 Div. 12, 7, 8
OTS Prices: HC $4.00/MF $0.75

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
XM15 RELIABILITY TEST EQUIPMENT PROGRAM CONNECTOR SWITCH TEST CONSOLE,
by Frank G. Maggio and William N. Hall. Jun 64, 116p
PA TM1438

Unclassified report

Descriptors: (*Guided missile components, Checkout equipment), (*Electric switches, Test sets), (*Test sets, Design), Electric connectors, Reliability, Test equipment (Electronics), Electric insulation, Resistance (Electrical), Ohmmeters, Time interval counters, Control panels, Calibration, Checkout procedures.

A connector switch test console was designed to provide qualification testing of the safing and arming, and power disconnect switches in the Pershing missile system for the Reliability Test Program. (Author)

AD-602 391 Div. 12, 27
OTS Prices: HC $2.00/MF $0.50

Training Center for Experimental Aerodynamics, Rhode-Saint-Genese (Belgium).
A POSSIBLE COMPROMISE BETWEEN ROCKET AND ATMOSPHERIC BRAKING.
Scientific rept. no. 3,
by L. Moulin. Jun 64, 42p VKI TN17
Grant AF EOAR63 39

Unclassified report

Descriptors: (*Spacecraft, Recovery), (*Space propulsion, Mathematical analysis), Optimization, Ablation, Heat shields, Aerodynamic heating, Fuel consumption, Atmosphere, Reentry vehicles, Space flight, Electric propulsion, Nuclear propulsion, Rocket propulsion, Rockets, Belgium.

An attempt was made to optimize the problem of recovering an interplanetary vehicle through the earth's atmosphere. Optimum conditions are defined as the ones which would minimize the dead weight, which includes the fuel required for eventual rocket braking outside the atmosphere, and the mass which is ablated for heat protection during the flight into the atmosphere. It is shown that when chemical or nuclear propulsion is considered, pure atmospheric braking is always the best solution, but when electrical propulsion can be used, an optimum compromise between partial rocket and atmospheric braking may exist, depending upon the respective qualities of the propulsion system and ablating material. (Author)

AD-602 417 Div. 12, 15
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE APPLICATION OF DYNAMIC PROGRAMMING TO A LINEAR TIME-VARYING SYSTEM,
by F. T. Smith. Jul 64, 44p RM-4099-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Dynamic programs, Linear systems), Differential equations, Matrix algebra, Vector analysis, Satellites (Artificial), Rendezvous trajectories, Intercept trajectories, Mathematical prediction.

This Memorandum discusses the application of dynamic programming to dynamical systems that can be described by linear time-varying differential equations. Two different mathematical formulations of the problem are discussed. One method is based on defining a relative system state vector and the other on defining a combined system state vector. It is shown how the two expressions obtained for the optimal control vector are equivalent. The two approaches are discussed in terms of a satellite rendezvous problem, and some computational formulas are derived for computing an approximate solution. (Author)

AD-602 441 Div. 12, 8
OTS Prices: HC $1.00/MF $0.50

Upper Air Research Lab, Univ. of Utah, Salt Lake City.
TEST OF TELESCOPING ANTENNAS FOR HIGH SPIN-RATE ROCKETS.
Scientific rept. no. 2,
by Ralph Haycock. 6 Apr 64, 19p
Contract AF19 628 447, Proj. 8653, Task 865302
AFCRL 64 430

Unclassified report

Descriptors: (*Rocket antennas, Tests), Aluminum, Antennas, Rockets, Spin, Velocity, Centrifugal fields, Structural properties, Theory, Numerical analysis.

This report presents the theoretical calculations and the results of a series of tests on 10 foot aluminum telescoping antennas to determine their suitability for use on high spin rockets. In particular, tests and calculations were made for a rocket the size of a Javelin with a spin rate of 10 rps. Tests were also made to determine the lowest spin rate sufficient to extend the antenna by centrifugal force. The calculations and tests indicated that 10 foot centrifugal erecting antennas were suitable for use on a Javelin type rocket having a spin rate between 2 and 10 rps. (Author)

AD-602 486 Div. 12, 1, 9
OTS Prices: HC $2.00/MF $0.50

Giannini Controls Corp., Malvern, Pa.
THE EFFECT OF ELASTICITY ON THE STABILITY OF MANNED ROTATING SPACE STATIONS,
by Frank J. Frueh and Jacob M. Miller. May 64, 28p
ARD TR02 004
Contract AF49 638 1015
AFOSR 64 0991

Unclassified report

workload imposed by validated requirements for the time period. The proposed system will not be sufficient to handle the workload if proposed additional requirements are validated during the time period. The recommended actions are: to discontinue the installation of the Navy contracted AN/USQ-20B computer systems; to up-grade the present IBM 7090 installation to an IBM 7094 plus four data channels and appropriate peripheral equipment; to reanalyze the AFWTR computer needs in late FY-65 or early FY-66 to determine if any new requirements are imposed. (Author)

AD-602 646 Div. 12, 1
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
IMPACT OF EQUIPMENT LIFE CHARACTERISTICS ON MISSILE TEST PLANNING,
by L. T. Mast. May 64, 24p RM-4102PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Electronic equipment, Reliability (Electronics)), (*Guided missiles, Test methods), (*Spacecraft, Electronic equipment), Probability, Costs, Life expectancy, Failure (Mechanics), Aircraft equipment, Helicopters, Performance (Engineering), Ground support equipment, Wear resistance, Hydraulic systems, Pneumatic systems, Quality control.

This memorandum examines the impact of prelaunch operations on the probability of successful R and D missile or space system launch and mission completion. To do this, the nature of equipment life characteristics is examined and data presented; secondly, methods aimed toward finding the amount of ground operation that minimizes the effect of life variations are discussed; from this follow the test planning and cost implications. Finally, conclusions are drawn and a test program proposed. (Author)

AD-602 651 Div. 12, 27
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
OPTIMUM GUIDED ASCENT,
by Frank M. Perkins. 25 Jun 64, 33p
TDR-269 4540 70 4
Contract AF04 695 269
SSD TDR64 120

Unclassified report

Descriptors: (*Ascent trajectories, Optimization), Spacecraft, Guided missiles, Trajectories, Guidance, Equations, Thrust, Pitch (Motion), Booster rockets, Fuel consumption, Ballistics, Vacuum, Numerical analysis.

Presented in this paper are simple approximate closed-form equations for the thrust attitude pitch program to minimize propellant consumption for any spacecraft or missile ascending in a vacuum. A small amount of aerodynamic force, such as frequently occurs in the early part of guided flight, should not invalidate these equations. Also presented are explicit guidance equations for the optimum pitch program, which were developed specifically for the case of constant thrust and propellant flow rate. Since the form of the optimum pitch angle-versus-time equation is independent of the variation of thrust acceleration with time, continuous application of this program is permitted through more than one propulsion stage to achieve maximum performance. (Author)

AD-602 669 Div. 12, 9
OTS Prices: HC $3.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
THE COMBINED AERODYNAMIC-PROPULSIVE ORBITAL PLANE-CHANGE MANEUVER,
by R. W. Bruce. 10 Jun 64, 56p TDR269 4550 10 9
Contract AF04 695 269
SSD TDR64 98

Unclassified report

Descriptors: (*Maneuvering satellites, Orbital trajectories), (*Orbital trajectories, Transfer trajectories), Space propulsion, Aerodynamic characteristics, Descent trajectories, Satellites (Artificial), Atmosphere entry.

Due to the relative expense of the orbital plane-change maneuver when it is accomplished by means of impulsive thrust, other techniques have been sought that would be more economical from the standpoint of required characteristic velocity. Two techniques that make use of combined aerodynamic and propulsive forces have been proposed by London and Nyland. These are reviewed, and their limitations, which are due in part to certain simplifying assumptions made in their analyses, are presented. This investigation demonstrates that both analyses, while valuable because they are presented in closed form, are limited to plane changes below 30 to 40 degrees. It is also shown that the combined maneuver is superior to the impulsive-thrust plane change for vehicles with lift-to-drag ratios greater than 1.5 and that the velocity savings that result as a consequence of using such maneuvers are on the order of 4000 to 5000 ft/sec, at most. As a result, it is concluded that, for certain situations, the combined aerodynamic-propulsive maneuver appears to be an attractive and available means for reducing the characteristic velocity requirement of the orbital plane change. (Author)

AD-602 694 Div. 12, 2
OTS Prices: HC $1.00/MF $0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN IMPROVED THEORY OF MOTION OF AN ARTIFICIAL SATELLITE,
by Boris Garfinkel. Feb 64, 25p
Proj. 1M010501A003
BRL 1242

Unclassified report

This work was performed under a National Academy of Sciences Senior Post-Doctoral Research Associateship.

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Orbital trajectories, Numerical analysis), Celestial mechanics, Potential theory, Perturbation theory, Equations, Motion.

AD-602 698 Div. 12, 27
OTS Prices: HC $1.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
APPLICATION OF NEAR OPTIMUM GUIDANCE EQUATIONS OVER TWO BOOSTER PROPULSION STAGES OF ANY SPACE BOOSTER,
by F. M. Perkins. 15 Jul 64, 13p TOR-269 4540 70 3
Contract AF04 695 269

Unclassified report

Final rept. for Mar 63-Mar 64,
by A. S. Buchman, K. J. Klarman and C. F. Matthews.
Apr 64, 309p CR588 130
Contract AF04 695 279, Proj. 3176, Task 317601
AL TDR64 62

Unclassified report

Descriptors: (*Adaptive control systems, Spacecraft), (*Digital computers, Adaptive control systems), Flight control systems, Computers, Data transmission systems, Feedback, Rendezvous spacecraft, Manned spacecraft, Space probes, Simulation, Feasibility studies.

Space mission effectiveness can be increased by providing vehicles with the ability to adapt to equipment failures and to unexpected events. The characteristic of adaptiveness can be incorporated into a vehicle through proper organization of data/command flow combined with preplanning of responses to abnormal situations. The study has verified that these functions can be implemented in an on-board digital computer-controller. Concepts and terminology, system organization, methodology and measures of effectiveness were developed and applied to two model missions. Evaluation of a well defined rendezvous spacecraft clearly indicates that substantial increases in mission success may be obtained through computer controlled adaptation. A second analysis applies the same system organization to a complex manned vehicle of the 1970's in order to define a useful upper limit to control computer requirements. The major conclusion of the study is that the implementation of adaptation is feasible, effective and practical. (Author)

AD-602 619 Div. 12
OTS Prices: HC $1.00/MF $0.50

Ordnance Aerophysics Lab., General Dynamics, Daingerfield, Tex.
DYNAMIC ROLL AND MOTOR SEPARATION TEST OF AN XADR-9A MODEL, IN THE BLOWDOWN FACILITY, FOR TRACOR, INC.,
by W. S. Talk. 8 Jul 64, 3p OAL 698
Contract NOw63 0405c

Unclassified report.

Descriptors: (*Abstracts, Guided missile models), (*Guided missiles, Abstracts), Tests, Booster rockets, Supersonic flight, Angle of attack, Airfoils, Guided missile components, Test facilities.

The TRACOR XADR-9A missile was set up in cell 6 and testing began on 26 May 1964. During the test period, ten (10) configurations were tested at Mach numbers of .8, .9, 1.0, and 1.1. The determination of the model roll rate was the primary objective of the test, at each Mach number and at 0, 5, and 10 degrees angle of attack. Two booster rocket separation tests were covered by Fastax movies to determine any in-flight effects of booster rocket separation. Two radial fin failures encountered during the test were caused by weak silver solder joints. Testing was completed 28 May 1964 and model was removed and returned to the test sponsor. (Report quoted in its entirety)

AD-602 628 Div. 12, 19
OTS Prices: HC $2.00/MF $0.50

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
X-20A GUIDANCE PHILOSOPHY AND MECHANIZATION.
Rept. for Nov 60-Dec 63.
May 64, 45p
SEG TDR64 5

Unclassified report

Descriptors: (*Manned spacecraft, Guidance), (*Guidance, Manned spacecraft), (*Boost-glide vehicles, Guidance), Inertial guidance, Control systems, Remote control systems, Recovery, Tests, Computers, Navigation, Energy, Performance (Engineering), Design, Analysis.

The report presents the total X-20A guidance philosophy and methods of mechanization. The general X-20A guidance requirements, the philosophy of operation in the primary and secondary modes, and a general description of the physical hardware which meets the established navigation and guidance requirements are presented. Status of the various guidance elements and some unique integration problems and solutions are also discussed. It is shown that the requirements for the once-around X-20A mission can be met with mature state-of-the-art sensors, techniques, and hardware elements. The qualification of the guidance subsystems to meet the X-20A mission and emergency requirements of a manned spacecraft was being assured by a comprehensive analytical simulation and test program. (Author)

AD-602 633 Div. 12, 22, 30
OTS Prices: HC $4.00/MF $0.75

Iowa State Univ., Iowa City.
LAUNCHERS, PHASE V, PART II, RESPONSE OF A LAUNCHER UNDERSTRUCTURE DURING A SIMULATED ROCKET LOADING.
Rept. no. 10,
by G. V. R. Reddy. May 64, 103p
Contract DA11 070 508ORD1232, Proj. 517 01 002

Unclassified report

Descriptors: (*Rocket launchers, Structural properties), Launching, Flexible structures, Models (Simulations), Loading (Mechanics), Vibration, Frequency, Deformation, Equations, Ballistics, Numerical analysis.

This report treats the dynamic response of a small tactical rocket launcher understructure during a simulated launch. The understructure is regarded as a flexible triangular frame which pivots about a fixed point at the rear and is supported by springs which simulate the ground support at the front. Results of the study indicate the understructure may play an important role in the suspected balloting of a rocket on the launcher rail. (Author)

AD-602 644 Div. 1 , 30
OTS Prices: HC $3.00/MF $0.75

Electronic Ssytems Div., Air Force Systems Command, Bedford, Mass.
COMPUTER CONFIGURATION ANALYSIS OF THE AIR FORCE WESTERN TEST RANGE, VANDENBERG AIR FORCE BASE, CALIFORNIA.
Jun 64, 60p
ESD TDR64 400

Unclassified report

Descriptors: (*Guided missile ranges, Data processing systems), (*Data processing systems, Guided missile ranges), Air force equipment, Computers, Test facilities, Systems engineering, Operations analysis, Costs.

The report is an evaluation of the present computer configuration that processes the pre-flight, real-time and post-flight data of the Pacific Missile Range. The evaluation assesses the present capability as to its adequacy at the time the Air Force assumes full responsibility for the Western Test Range. It is determined that the present system is not sufficient to handle the needs of the range for the time period 1965-1969. The proposed system will cover the

13. Installations and Construction

AD-602 416 Div. 13
OTS Prices: HC $4.00/MF $1.00

Badger (W. L.) Associates, Inc., Ann Arbor, Mich.
STUDY OF PROCESSES FOR THE PRODUCTION OF POTABLE WATER FROM AQUEOUS WASTES DEVELOPED IN A SHELTER.
Oct 62, 132p
Contract OCD OS62 120, Proj. 1413

Unclassified report

Descriptors: (*Shelters, Water supplies), (*Water supplies, Purification), (*Wastes (Sanitary engineering), Purification), Distillation, Ion exchange, Adsorption, Electrodialysis, Osmosis, Evaporation, Air conditioning equipment, Confined environments.

The study evaluated many known means of converting aqueous shelter wastes into potable water. A comparison of various processes led to the selection of the three most feasible systems with a system of pre- and post-treatment and testing common to all. The processes selected as most likely to produce acceptable potable water are: vapor compression distillation; ion exchange and charcoal adsorption; and Electrodialysis. Preliminary specifications of equipment, utilities consumed and estimated costs are given for each process. Water from the air, extracted by an air conditioning system, is discussed and recommendations made. Recovery systems are contrasted to the normal means of water supply and it is recommended that the conventional means of supply should ordinarily used. Recommendations are made for future research and development work. A bibliography covering the literature studied, charts and process flow diagrams are included. (Author)

AD-602 456 Div. 13, 2
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
DYNAMIC RESPONSE OF LINED AND UNLINED UNDERGROUND OPENINGS,
by C. C. Mow. Mar 64, 86p RM-3962-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Underground structures, Feasibility studies), (*Dynamics, Loading (Mechanics)), Stresses, Mechanical waves, Geology, Shock (Mechanics), Vulnerability, Structures, Mechanical properties, Rock (Geology), Numerical analysis, Harmonic analysis.

This memorandum presents a brief review of the recent development of stress-wave-cavity interaction problems pertinent to the design of underground openings for protective construction. There exists a considerable amount of recent literature on the dynamic responses of cavities subjected to stress-wave loadings that can be applied to the problem of underground openings. This memorandum, in a systematic manner, outlines and derives each approach and gives the various assumptions in the analyses. Dynamic-stress concentration factors for lined and unlined cylindrical cavities subjected to plane-compressional and shear waves of step type and harmonically time-varying waves are derived, and numerical results are given in a parametric form for design purposes. Comparisons between the static case and the dynamic case are also given. The results in this memorandum indicate that under the assumptions of earth media being elastic, homogeneous, and isotropic, the dynamic-stress concentration factors for all cylindrical-cavity cases, whether elastically lined or unlined, are all about 10 to 20 per cent higher than those for their corresponding static cases.

AD-602 738 Div. 13, 2, 30
OTS Prices: HC $6.00/MF $1.50

Illinois Univ., Urbana.
A STUDY OF THE BEHAVIOR OF A CLAY UNDER RAPID AND DYNAMIC LOADING IN THE ONE-DIMENSIONAL AND TRIAXIAL TESTS.
Final rept.
by H. Kane, M. T. Davisson, R. E. Oleson and G. K. Sinnamon. Jun 64, 296p
Contract AF29 601 5535, Proj. 1080, Task 108003
RTD TDR63 3116

Unclassified report

Descriptors: (*Clay, Compressive properties), (*Soil mechanics, Clay), Soils, Dunamics, Loading (Mechanics), Stresses, Strain (Mechanics), Creep, Failure (Mechanics), Test methods, Test equipment, Engineering geology, Underground structures, Vulnerability, Nuclear explosions.

The behavior of soil under dynamic loading is an important factor in the soil-structure interaction problem. To study this behavior, a series of dynamic, high-pressure triaxial and one-dimensional compression tests has been conducted. Special testing devices developed for this research are described. In the one-dimensional tests, the peak pressures ranged from 620 psi to 11,300 psi with rise times to the peak pressure of 1.9 milliseconds to 1,625 milliseconds. In the triaxial tests, cell pressure from 100 psi to 1,010 psi were used with times-to-failure varying from 3 milliseconds to 100 seconds. In addition, partial loading triaxial tests were run in which the applied axial stress was 20 percent to 60 percent of the failure stress. The soil used was a compacted silty clay of low plasticity. The test results are presented and the influence of rate of loading and pressure level on compressive strength, ratio of lateral to axial pressures, stress-strain relations, residual strains, and creep under constant load are evaluated. (Author)

AD-602 764 Div. 13
OTS Prices: HC $7.00/MF $1.75

Parsons (Ralph M.) Co., Los Angeles, Calif.
A STUDY OF THE FEASIBILITY OF SHOCK ISOLATING VERY LARGE MANNED UNDERGROUND STRUCTURES,
by H. R. Saffell, J. G. Ved, and L. S. Thomas.
Jun 64, 377p
Contract AF29 601 6053, Proj. 8811
WL TDR64 53

Unclassified report

Descriptors: (*Underground structures, Manned), (*Vibration isolators, Feasibility studies), Explosion effects, Nuclear explosions, Blast, Shock (Mechanics), Oscillation, Motion, Damping, Shelters, Concrete, Survival kits, Communication equipment, Tanks (Containers), Fluids, Storage, Mathematical analysis.

The feasibility of shock-isolating very large manned underground structures from the intense ground motions generated by a nuclear blast was investigated. The structure under consideration housed personnel living quarters, and communications and survival equipment, including large liquid-filled tanks, and was suspended within a concrete-lined underground cavity. Various suspension configurations, isolators, and damping

Descriptors: (*Guidance, Equations), (*Ascent trajectories, Optimization), (*Booster motors, Thrust), Second-stage motors, Staging, Guided missile trajectories, Pitch (Motion), Command guidance, Space propulsion, Fuel consumption, Ballistics, Vacuum, Propellant burn-out.

The purpose of this document is to present additional equations that are necessary to simplify the application of the single pitch program across two thrust stages. These guidance equations could then be mechanized for explicit guidance during the guidance phase of the first stage and, in addition, for the entire second stage; or, alternatively, they could be used on a general-purpose computer before flight to determine the nominal optimum pitch-time equation that could then be flown open-loop up to the initiation of the final propulsive stage--which would then be flown closed-loop, using the explicit solution obtained in AD-602 651. (Author)

AD-602 766 Div. 12
OTS Prices: HC $3.00/MF $0.50

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
METHODS FOR ESTIMATING ACCURACY OF FOSITION, VELOCITY, AND ACCELERATION DATA.
Jun 64, 55p
IRIG 103 64

Unclassified report

Descriptors: (*Guided missile ranges, Instrumentation), Guided missiles, Guidance, Tracking, Position finding, Velocity, Acceleration, Errors, Statistical analysis.

Contents: methods used to estimate random errors (least squares point estimates, multi-instrument estimates, the variate difference method, the least square curve fitting method); methods used to evaluate systematic errors (analytical investigation of possible error sources, comparison of observations from different systems, analysis of measuring residuals from over determined least squares solutions, analysis of residuals from a best estimate of trajectory); velocity and acceleration determination; theory of error propagation (propagation of errors into position, error propagation in the same coordinate system, effects of smoothing on data, inertial guidance data).

AD-602 783 Div. 12, 15, 30
OTS Prices: HC $8.85/MF $2.50

Space Technology Labs., Inc., Redondo Beach, Calif.
ESPOD MATHEMATICAL AND SUBROUTINE DESCRIPTION.
24 Jun 64, 585p, STL 8497 6065RU000
Contract AF19 628 594, Proj. ES3 496L3627
ESD TDR64 395

Unclassified report

Descriptors: (*Orbital trajectories, Programming (Computers)), (*Programming (Computers), Orbital trajectories), Handbooks, Compilers, Mathematical programming, Least square method, S-matrix, Numerical analysis, Corrections, Gravity, Drag, Moment of inertia.

The primary function of this report is to provide the specialist in the field an in-depth treatment of the mathematical and related computer processes used to develop the ESPOD program. Secondarily, it is arranged to include the fundamental organization of the program, the background and general information relative to its options and the computer subroutines and coordinate systems. For an abridged technical discussion of ESPOD it is recommended that ESD-TDR-64-393 (AD-602 108), ESPOD Functional Description, be consulted. The analyst-operator requiring operational information should consult ESD-TDR-64-394 (AD-602 064), ESPOD Operating Instructions and Card Formats. (Author)

AD-602 832 Div. 12, 15, 30
OTS Prices: HC $1.00/MF $0.50

Naval Weapons Lab., Dahlgren, Va.
A COMPUTER PROGRAM TO COMPUTE ORBITAL ELEMENTS FROM POSITION AND VELOCITY OR POSITION AND VELOCITY FROM ORBITAL ELEMENTS.
Technical memo.
by Mary B. Palen. May 64, 17p
NWL K-37 64

Unclassified report

Descriptors: (*Programming (Computers), Orbital trajectories), (*Orbital trajectories, Programming (Computers)), Satellites (Artificial), Trajectories, Tracking, Position finding, Velocity, Vector analysis, Compilers, Input-output devices.

A detailed description, including flow charts and FORTRAN IV listings, is given for a program which uses position and velocity to compute orbital elements or which uses orbital elements to compute position and velocity. (Author)

AD-602 834 Div. 12, 22, 31
OTS Prices: HC $2.00/MF $0.50

Naval Weapons Lab., Dahlgren, Va.
MISSILE LAUNCHING ZONE FOR THE USS JOHN KING (DDG-3),
by T. A. Trant and J. L. Lindsey. 6 Jul 64, 42p
NWL 1928, NAVWEPS 8340

Unclassified report

Descriptors: (*Guided missiles, Launching sites), (*Launching sites, Destroyers), Launchers, Naval vessels (Combatant), Structural parts, Fire control systems, Numerical analysis, Mechanical drawings, Weapon systems.

This report presents the factors considered in the computation and analysis required in the determination of the guided missile launching zone for the USS JOHN KING (DDG-3). The missile launching zone is defined and a structural grid chart is given. The DDG-3 is a guided missile destroyer which employs a MARK 8 MOD O launcher in a MARK 11 MOD O launcher system. (Author)

14. Materials (Non-Metallic)

AD-602 302 Div. 14, 32
OTS Prices: HC $2.00/MF $0.50

Forest Products Lab., Madison Wis.
LIST OF PUBLICATIONS ON THE CHEMISTRY OF WOOD.
May 64, 34p

Unclassified report

Reprint of FPL rept. no. 238.

Descriptors: (*Wood, Bibliographies), (*Bibliographies, Wood), Wood pulp, Lignin, Charcoal, Paper, Plastics, Laminates, Chemical analysis, Chromatographic analysis, Biochemistry, Physical properties, Cellulose, Patents, Microstructure, Surface properties, Spectroscopy, Carbohydrates.

The bibliography lists 247 publications that give general information and results of research by the U. S. Forest Service on the analysis, chemical and physical properties, and conversion processes of wood and wood products. (Author)

AD-602 303 Div. 14
OTS Prices: HC $6.00/MF $1.25

Forest Products Lab., Madison, Wis.
CHANGES IN MILL RUN HARDWOOD SAWLOG LUMBER GRADE YIELDS WHEN VENEER LOGS ARE WITHDRAWN.
Research note,
by Richard O. Woodfin, Jr. May 64, 256p
FPL 13

Unclassified report

Descriptors: (*Wood, Industrial production), Plywood, Quality control, Trees, Surface properties, Standards, Commerce, Costs, Tables, Data.

This research paper shows how the volume and value of lumber grade yields, from mill-run hardwood logs of a given species, diameter, and sawlog grade, vary with the withdrawal of veneer quality logs. The tabulated data is given as a guide to sawmill owners in deciding whether or not to sell veneer logs and whether such sale would result in a less salable mix of lumber grade. (Author)

AD-602 304 Div. 14
OTS Prices: HC $2.00/MF $0.50

Forest Products Lab., Madison, Wis.
PERFORMANCE OF NAIL-GLUED JOINTS OF PLYWOOD TO SOLID WOOD.
Research note,
by D. V. Doyle. Jun 64, 40p
FPL 042

Unclassified report

Descriptors: (*Joints, Plywood), Wood, Shear stresses, Strength, Atmosphere, Humidity, Degradation, Fastenings, Adhesives, Moisture, Storage.

Results of experimental research to study the effect of exposure at different atmospheric conditions on the shear strength of three-member joints of 5/8-inch Douglas-fir plywood nail-glued to 2 by 6 Douglas-fir are given. The factors investigated included joints assembled at the same and at different moisture contents, joints with the face grain of the plywood oriented at 0F, 30F, 45F, and 90F with the grain of the solid wood and exposure of the joints to indoor storage, outdoor storage, and cycling between controlled atmospheres of relatively high and low relative humidity. (Author)

AD-602 305 Div. 14
OTS Prices: HC $1.00/MF $0.50

Forest Products Lab., Madison, Wis.
NAILING DENSE HARDWOODS.
Research note,
Jun 64, 14p
FPL 037

Unclassified report

This is a reprint of Technical note no. 247, under the same title, which was reissued Oct. 61. The original note was written in Apr 41.

Descriptors: (*Wood, Joining), (*Fastenings, Wood), Hardness, Fracture (Mechanics), Physical properties, Construction, Density, Beeswax.

The hardness and nailing characteristics of several species of hardwoods are discussed, and the problem of nailing dense hardwoods is considered.

AD-602 306 Div. 14
OTS Prices: HC $1.00/MF $0.50

Forest Products Lab., Madison, Wis.
LIMITED EVALUATION OF PHYSICAL AND MECHANICAL PROPERTIES OF NEPAL ALDER GROWN IN HAWAII.
Research note,
by C. C. Gerhards. May 64, 16p
FPL 036

Unclassified report

Descriptors: (*Wood, Physical properties), Trees, Hawaii, Strength, Elasticity, Hardness, Mechanical properties, Furniture, Data, Tables.

Nepal alder (Alnus nepalensis) grown in Hawaii was evaluated for shrinkage, strength in bending, and hardness. It is compared to the same species grown in India and to such Mainland species as aspen, ponderosa pine, and red alder. (Author)

AD-602 307 Div. 14, 32
OTS Prices: HC $1.00/MF $0.50

Forest Products Lab., Madison, Wis.
STRENGTH AND RELATED PROPERTIES OF WHITE FIR,
by C. C. Gerhards. Jun 64, 16p
FPL 14

Unclassified report

Descriptors: (*Wood, Physical properties), Trees, Strength, Growth, Mechanical properties, Elasticity, Hardness, Toughness, Shear stresses, Compressive properties, Data, Tables, California, Oregon.

A reevaluation of the strength properties of white fir revealed slight increases in species stiffness for green and air dry wood and notable increases in shear strength of air dry wood. (Author)

AD-602 334 Div. 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ANALYSIS OF CREEP IN ORTHOTROPIC FIBERGLASS,
by M. A. Koltunov and V. N. Bezukhov. 18 Jun 64, 14p
FTD TT64 372; TT 64 11860

Unclassified report

Unedited rough draft trans. of Moscow U. Vestnik.

devices were investigated and their performance characteristics compared with the specific requirements of this facility. It is concluded that an inclined, elastic, pendular suspension system incorporating fluid-filled isolators and force-limited dampers provides satisfactory control over the body motions without exceeding acceptable accelerations. Conventional cage structure and liquid storage techniques are found to be acceptable if careful attention is given to their design. (Author)

AD-602 802 Div. 13, 26
OTS Prices: HC $4.00/MF $1.00

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF BASIS FOR ALLOCATING MAINTENANCE RESOURCES.
Research rept. for 20 Jan-15 Jul 64.
Jul 64, 140p
Contract NBy32257

Unclassified report

Descriptors: (*Management engineering, Naval shore establishments) (*Naval shore establishments, Personnel), (*Maintenance, Naval shore establishments), Manpower studies, Economics, Inventory, Time studies, Job analysis, Costs, Equations, Statistical analysis, Mathematical models, Correlation techniques, Personnel management.

This study was undertaken to develop new and reliable methods for annual public works resource allocations to U.S. Naval shore activities for maintenance of Class II Real Property facilities. Existing data from 134 activities located in the eastern United States were selected for analysis. Economic, geographic, climatic, organizational, and operational factors and measurements were considered and evaluations made to estimate their influence on maintenance fund and manpower requirements. Regression equations, based on data from a selected number of building types and the 134 activities, are given for estimating requirements. Applications of the equations for sample estimates are encouraging, but results indicate need for further refinement and extension of the analysis. Recommendations are made for temporary use of pertinent equations with judicious consideration of their inherent limitations. As such, these methods should be useful as a management tool for resource allocations at field engineering offices and for planning at the Bureau of Yards and Docks. (Author)

AD-602 803 Div. 13, 26
OTS Prices: HC $3.00/MF $0.75

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF BASIS FOR ALLOCATING MAINTENANCE RESOURCES (PUBLIC WORKS PERSONNEL).
Research rept. for 20 Jan-15 Jul 64.
Jul 64, 61p
Contract NBy32257

Unclassified report

Descriptors: (*Personnel management, Naval shore establishment), (*Naval shore establishments, Personnel), (*Maintenance, Naval shore establishments), Management engineering, Manpower studies, Time studies, Economics, Job analysis, Specifications, Equations, Statistical analysis, Housing, Civilian personnel, Military personnel, Replacement theory.

A study was undertaken to develop new and reliable methods for allocating personnel resources annually to U. S. Naval shore activities for maintenance of Class II Real Property. Under existing budgetary procedures, projections of resource requirements are mandatory in terms of both dollars and personnel by body or man-year counts. Results of 5 analyses are presented, and methods for possible use in allocation of public works personnel are proposed for future refinement and test.

AD-602 943 Div. 13, 2
OTS Prices: HC $3.00/MF $0.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
EARTHQUAKE DAMAGE TO ANCHORAGE AREA UTILITIES, MARCH, 1964.
Technical note,
by J. M. Stephenson. 26 Jun 64, 66p
Projs. Y F008 08 02 112, DASA13 018
NCEL N607

Unclassified report

A portion of this document is illegible or non-reproducible.

Descriptors: (*Earthquakes, Alaska), (*Alaska, Earthquakes), Shock waves, Disasters, Damage, Power supplies, Water supplies, Communication equipment, Buildings, Photographs, Engineering geology, Civil engineering.

The report describes the nature of damage suffered by utilities such as power, gas and water and, where possible, reviews the sequence of events which led to their recovery on a temporary basis. The damage suffered by the utilities is related to the type of shock waves travelling through the soil and the nature of the soil itself. Much of the soil under Anchorage is Bootlegger Cove clay and silt which has very poor shear strength, and the intense shock of this quake was sufficient in some areas to cause large landslides. Utilities in such areas were almost completely destroyed. Where the soil held firm the rolling motion mentioned previously did not have serious effects on mechanical equipment at or near the surface of the earth, however tall structures swayed considerably in all directions resulting in serious damage to fans, motors and piping in the upper floors of some buildings. A comparison between earthquakes and atomic bombs with respect to energy released is treated briefly in the Appendix.

Materials were selected for 850C potassium vapor exposure. A transformer was designed and selected as a test device to determine the combined effect of 600C potassium vapor, fluctuating magnetic fields and high a-c voltage on insulators, potting compounds, magnetic materials, and electrical conductors. Potassium vapor corrosion tests are in progress on the materials that will be used in the final test transformer. Ceramic to metal seal development is being studied extensively as terminal seals for electrical feed throughs will be needed for electrical testing in potassium vapor at elevated temperatures. (Author)

AD-602 472 Div. 14, 8
OTS Prices: HC $1.00/MF $0.50

Istituto Universitario Navale, Naples (Italy).
MATCHING AND ABSORBING E.M. MATERIALS.
Annual summary rept. no. 2, 1 Feb 63-31 Jan 64,
by G. Latmiral, G. Franceschetti and R. Vinciguerra.
20 Feb 63, 16p
Contract AF61 052 589

Unclassified report

Descriptors: (*Electromagnetic waves, Absorption) (*Dielectrics, Absorption), Microwaves, Scattering, Reflection, Refractive index, Impedance matching, Laminates, Taper, Italy.

The results of a theoretical and experimental research on layered, or geometrically tapered, matching or absorbing materials are reviewed. For obtaining materials having prescribed em constants, artificial dielectrics (of the obstacle or mixture type) can be used. Simple matching or absorbing devices can be realized by means of conical obstacle or hole type artificial dielectrics. (Author)

AD-602 476 Div. 14, 17, 26
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
SUMMARY OF THE EIGHTH MEETING OF THE REFRACTORY COMPOSITES WORKING GROUP.
by E. S. Bartlett and H. R. Ogden. 20 Apr 64, 25p
DMIC M192
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Coatings, Refractory materials), (*Refractory materials, Composite materials), (*Composite materials), High-temperature research), Rocket cases, Mechanical properties, Refractory metals, Cermets, Fastenings, Ceramic materials, Ablation, Powder metallurgy, Metal coatings, Joining, Plastics, Ceramic coatings, Organic coatings, Refractory coatings, Flame spraying, Symposia, Manufacturing methods, Bonding, Diffusion, Extrusion, Porous materials, Pyrolytic graphite, Oxides, Carbides, Magnesium compounds, Titanium compounds, Beryllium compounds, Zirconium compounds, Aluminum compounds, Niobium, Tungsten, Sapphires, Mixtures, Vapor plating, Single crystals.

This memorandum summarizes information on refractory materials and composites as presented at the Eighth Meeting of the Refractory Composites Working Group in Fort Worth, Texas, January 14-16, 1964. This memorandum is based on 45 papers covering a wide variety of subjects ranging from basic studies on oxidation mechanisms to the development of specific pieces of hardware. The papers are reviewed and discussed briefly within the framework of the following four broad areas: materials technology, process technology, specific hardware applications, and evaluation techniques. Included in the section on materials technology are discussions dealing with bulk refractory materials and coated-metal systems. Hot spraying, chemical vapor deposition, powder processes, joining, and extrusion are discussed in the section on process technology. The specific hardware applications cover rocket-motor components, nose caps, leading edges, hot skins, and fasteners. (Author)

AD-602 495 Div. 14
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
AN INVESTIGATION OF MATERIAL PARAMETERS INFLUENCING CREEP AND FATIGUE LIFE IN FILAMENT WOUND LAMINATES.
Rept. no. 25 (Final), 1 Oct 62-31 Mar 64,
by R. H. Cornish, B. W. Abbott, and C. K. Cole. May 64, 65p
IITRI M251
Contract NObs86461, Proj. S F013 05 03, Task 1025

Unclassified report

Descriptors: (*Laminated plastics, Filament wound construction), (*Filament wound construction, Laminated plastics), Glass textiles, Reinforcing materials, Plastics, Composite materials, Stresses, Ultrasonic radiation, Density, Compressive properties, Environmental tests, Deformation, Fracture (Mechanics), Failure (Mechanics), Cylindrical bodies, Epoxy plastics, Creep, Fatigue (Mechanics), Environmental tests.

The results of the environmental (wet vs dry) effects on the biaxial fatigue and creep (stress-rupture) performance of glass reinforced plastics having 20 and 26 percent resin contents is presented. Characterization of the materials in regard to resin content and density determination, ultrasonic flaw detection, and residual stress are included. Correlation of ultrasonic flaw scan patterns with sites of principal failure is made. Residual strain measurements on ring specimens using both 'peel' and 'cut coupon' techniques are shown to indicate residual tensile stress on the inside surface of the ring and residual compression on the outside. The results of wet and dry biaxial fatigue experiments at nominal cycle rates of 200 cph are presented and compared. The results indicate no significant difference in performance of either of the materials considered for the wet and dry test environments used. The results of biaxial stress rupture experiments in progress for as long as 14 months are presented. Stress rupture experiments to date show that excessive deformation and failure due to sustained stresses is of secondary importance when compared to the more severe fatigue effects. (Author)

AD-602 508 Div. 14, 8, 25
OTS Prices: HC $3.00/MF $0.75

Sperry Microwave Electronics Co., Clearwater, Fla.
INVESTIGATION OF LARGE SIGNAL MICROWAVE EFFECTS IN FERROELECTRIC MATERIALS.
Quarterly rept. no. 3, 1 Jan-31 Mar 64,
by G. A. Burdick and T. J. Lyon. Apr 64, 59p
SJ230 0048 3
Contract DA36 039AMC03240E, Proj. 1G6 22001A055 04

Unclassified report

Descriptors: (*Ferroelectric materials, Titanates), (*Titanates, Electrical properties), Ceramic materials, Ferroelectric crystals, Barium compounds, Strontium compounds, Nickel compounds, Lead compounds, Single crystals, Glycines, Sulfates, Phase shift, Microwave equipment, Environmental tests, Dielectric properties, Extremely high frequency, Temperature, Phase transformers, Parametric amplifiers, Harmonic oscillators.

Theory and techniques are discussed, and experimental results are reported, for measurements on selected ferroelectrics of interest in this program. The measurements include: (1) Insertion loss and phase shift as a

Seriya 1: Matematika, Mekhanika (USSR) 1963 [v. 18] no. 6, p. 64-70.

Descriptors: (*Creep, Glass textiles), (*Glass textiles, Creep), Deformation, Relaxation time, USSR, Polyester plastics.

Results are presented for the investigation of creep in fiberglass comprised of polyester polymer PN-1 and glass cloth with serge interweave T-1. (Author)

AD-602 351 Div. 14, 32
OTS Prices: HC $2.00/MF $0.50

Forest Products Lab., Madison, Wis.
LIST OF PUBLICATIONS ON STRUCTURAL SANDWICH, PLASTIC LAMINATES, AND WOOD-BASE COMPONENTS.
May 64, 40p
Unclassified report

Previously issued as FPL rept. no. RPI-4.

Descriptors: (*Wood, Bibliographies), (*Bibliographies, Wood), (*Sandwich construction, Bibliographies), (*Laminated plastics, Bibliographies), Plywood, Joints, Fastenings, Laminates, Plastics, Wood pulp, Paper, Lignin, Adhesives, Shear stresses, Physical properties, Discoloration, Forestry.

The bibliography lists 261 publications on structural sandwich, plastic laminates, and wood-base components. Topics include: solid wood, plywood and veneers, joints and fastenings, wood and plywood structural members, all-wood laminates, plastic laminates, stabilized wood and wood-resin laminates, pulp, paper, and lignin laminates, adhesives and glue-joint properties, sandwich construction, and pathological and biological features.

AD-602 363 Div. 14, 4
OTS Prices: HC $2.00/MF $0.50

Value Engineering Co., Alexandria, Va.
RESEARCH AND DEVELOPMENT OF EROSION AND OXIDATION RESISTANT COATINGS FOR GRAPHITE.
Quarterly rept. no. 1, 13 Mar-12 Jun 64,
by E. Goodman, R. Thompson, and T. Hogland. 13 Jul 64, 26p
Value 5RD64
Contract N600 19 61804
Unclassified report

Descriptors: (*Graphite, Corrosion inhibition), (*Cermets, Coatings), (*Ceramic materials, Chemical analysis), Chromium, Antioxidants, Zirconium compounds, Dioxides, Tantalum compounds, Carbides, Electroplating, Electrodeposition, Erosion, Electric currents, Density, Temperature.

Attempts were made to increase the ceramic content of the electrodeposited chromium-base cermet coating developed previously. Many plating variables, such as current density, solution temperature, plating solution composition and flashing time and current density, were investigated. The use of a dispersing agent and the effect of different concentrations of ceramic in the plating solution on the amount of ceramic occluded in the coating were studied. It was found that increasing the ceramic concentration to 0.133 ml per ml of plating solution resulted in a coating containing 5% ceramic. (Author)

AD-602 370 Div. 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SCIENTISTS IN CHEMISTRY: PEOPLE'S ECONOMY (PELLICULAR MIRROR, STURDY GLASSES).
10 Jun 64, 6p
FTD TT64 469; TT 64 11878
Unclassified report

Unedited rough draft trans. from Zarya Vostoka (USSR) 1963, 21 Nov, p. 1.

Descriptors: (*Heat-resistant glass, USSR), (*Mirrors, Telescopes), (*Telescopes, Mirrors), Installation, Costs, Metal films, Metal coatings, Solar radiation, Reflection, USSR, Rare earth elements, Glass.

In gigantic telescopes the diameters of main mirrors reach several meters, and these mirrors weigh many tons. This, of course, makes the assembly and exploitation of the installation, difficult. A substantial deficiency is that the reflection coefficient of ordinary glass mirrors is only about 0.71. Scientists of Uzbekistan decided to produce mirrors which are more convenient in use and more economical. Right now this problem has been solved successfully. The scientists tested a metal plated synthetic film which reflects up to nineteen percent of luminous energy. The use of such pellicular mirrors offers the possibility of considerably reducing the weight of installations which collect solar energy. (Author)

AD-602 413 Div. 14, 17
OTS Prices: HC $2.00/MF $0.50

Harry Diamond Labs., Washington, D. C.
A LOW-DENSITY ALUMINUM-CERAMIC MATERIAL,
by R. R. Palmisano and J. Drager. 5 Jun 64, 29p
Projs. 1B242403D232, 60400
HDL TR1229
Unclassified report

Descriptors: (*Aluminum, Porous materials), (*Ceramic materials, Aluminum), Composite materials, Castings, Casting alloys, Spheres, Density, Physical properties, Magnesium alloys, Costs.

An evaluation was made of the physical properties of a newly developed low-density aluminum-ceramic material. The low density is achieved by filling a casting mold with minute hollow ceramic spheres and forcing molten aluminum into the mold. Since the hollow ceramic spheres are of low density and occupy an appreciable volume within the resulting mixture, an alluminum 'alloy' results that has about one-half the density of aluminum and is inexpensive to produce. Examination of the physical properties of this filled-aluminum material shows that it possesses sufficient integrity for use as a structural material. A comparison of its physical properties with those of magnesium K1A and aluminum A356 is presented. (Author)

AD-602 449 Div. 14, 8
OTS Prices: HC $3.00/MF $0.75

Westinghouse Electric Corp., Lima, Ohio.
HIGH TEMPERATURE ALKALI METAL RESISTANT INSULATION.
Quarterly progress rept. no. 1, 1 Apr-30 Jun 64,
by W. H. Snavely, R. E. McVay, and R. E. Stapleton.
10 Jul 64, 87p WAED 64 39E
Contract AF33 615 1360, Proj. 8128, Task 812806
Unclassified report

Descriptors: (*Electric insulation, Corrosion), (*Alkali metals, Vapors), Corrosive gases, Potassium, Electrical equipment, Transformers, Magnetic fields, Electric currents, Encapsulation, Magnetic materials, Seals (Stoppers), Aluminum compounds, Yttrium compounds, Oxides, Niobium alloys, Cladding.

Contract AF33 616 6915, Projs. 7350, 7381,
Tasks 735002, 738102
WADD TR61 72 V26

Unclassified report

Descriptors: (*Graphite, Physical properties), (*Composite materials, Graphite), (*Refractory materials, Graphite), High-temperature research, Experimental data, Density, Pressure, Thermal expansion, Thermal stresses, Thermal conductivity, Recrystallization, Carbon, Elasticity, Resistance (Electrical), Tensile properties, Shear stresses, Permeability, Admittance, Porosity, Laminates, Shock resistance, Compressive properties, Textiles.

Physical properties are measured on graphites recently developed and/or evaluated. Methods of and equipment for making these measurements are described. The physical properties are reported for 17 newly developed graphite grades which include six high-density, recrystallized graphites designated as ZT grades; six graphites in which the fillers are shredded or woven carbonized cloths designated as PT grades; and five pressure-cured and/or impregnated grades designated as RVA, RVC, RVD, CFZ, and CFW. Similar properties of ATJ graphite are presented as a basis for comparing the newly developed grades with a well established, premium grade of graphite. (Author)

AD-602 679 Div. 14, 4, 26
OTS Prices: HC $4.00/MF $0.75

Narmco Industries, Inc., San Diego, Calif.
HIGH-TEMPERATURE STRUCTURAL ADHESIVES.
Final summary rept. for 1 Mar 63-15 Apr 64,
by Paul M. Hergenrother, Wolfgang J. Wrasidlo and Harold H. Levine. 15 Apr 64, 116p
Contract NOw63 0420c

Unclassified report

Descriptors: (*Adhesives, Heat-resistant plastics), (*Heat-resistant plastics, Adhesives), Polymers, Polyamide plastics, Aromatic compounds, N-heterocylic compounds, 7 hiazoles, Quinoxalines, Synthesis (Chemistry), Laminated plastics, Polymerization, Infrared spectroscopy, Tensile properties, Transition temperature, Gravimetric analysis, Viscosity.

This report concerns the synthesis of polymers possessing hydrolytic, oxidative, and thermal stability which are potentially useful as structural adhesives and laminating resins. The four systems investigated were the polyimides, polybenzothiazoles, polyquinoxalines, and polythiazolothiazoles. Synthetic emphasis was concentrated on condensation reactions in which the formation of the heterocyclic ring created the polymer chains. To achieve thermal stability, the heterocyclic rings were linked together through arylene units. A major portion of the program involved the synthesis of prepolymers of sufficiently low molecular weight to permit good solubility and fusibility which upon further condensation gave high molecular weight, thermally stable polymers. Solubilizing moieties such as diphenyl ether, benzophenone, pyridine, and diphenyl sulfone were incorporated in the polymer chain in an attempt to improve processability. The course of the reactions was followed by performing physical measurements such as inherent viscosity, specific extinction coefficient, thermal gravimetric analysis (TGA), glass transition temperature (Tg), and changes in infrared spectra. Selected polymeric systems were evaluated for potential use as structural laminates and adhesives by fabricating laminates, usually 2-ply, and tensile shear specimens. (Author)

AD-602 715 Div. 14
OTS Prices: HC $0.75/MF $0.50

Rock Island Arsenal Lab., Ill.
THE COMPOSITE COMPONENT PROPERTY RELATIONSHIP OF PLASTIC FILMS.
by L. W. Lynch. 4 Mar 64, 19p
Proj. 1A024401A110 05
RIAL 64 731

Unclassified report

Descriptors: (*Packing materials, Plastics), (*Laminated plastics, Films), (*Composite materials, Plastics), Tensile properties, Packaging, Test methods, Adhesives, Elastomers, Moisture, Physical properties.

The relationship of certain properties of composite plastic films to the properties of the plastic films comprising their structure was studied. It was ascertained that tensile, tearing strength, puncture resistance and moisture vapor transmission rates of composite films can be closely approximated by calculations based on the component properties. The theoretical values are not valid if deteriorating substances are allowed in contact with susceptible plastics during the composite fabrication. (Author)

AD-602 716 Div. 14
OTS Prices: HC $1.25/MF $0.50

Rock Island Arsenal Lab., Ill.
EVALUATION OF PHOSPHATE FINISHES ON STEEL AS UNDERCOATS FOR ARMY PAINT SYSTEMS.
by J. Knanishu. 26 Nov 63, 54p
Proj. 1A024401A110 05
RIAL 63 3893

Unclassified report

Descriptors: (*Phosphate coatings, Corrosion inhibition), (*Corrosion inhibition, Steel), (*Steel, Phosphate coatings), Organic coatings, Phosphates, Iron compounds, Manganese compounds, Zinc compounds, Paints, Paint primers, Phosphoric acids, Thickness, Cleaning, Salt spray tests, Environmental tests, Solutions, Time, Experimental data.

Fifty different sets of prepared specimens were used in the study. Forty-one commercial phosphating products, 3 commercial wash primers and 4 phosphating process solutions in use at the Rock Island Arsenal were used. Also included was a diluted commercial phosphoric acid rust remover and metal conditioner and one control set comprised only of cleaned steel. All phosphated panels were processed in accordance with directions supplied by the manufacturer. Six panels from each of the 50 sets of panels prepared were coated with one of the 9 different systems of organic coatings. The prepared panels were scored and mounted on outdoor exposure racks. This report covers the results of 8 years of South (at 45 degrees) exposure at Rock Island Arsenal. (Author)

AD-602 718 Div. 14
OTS Prices: HC $0.50/MF $0.50

Rock Island Arsenal Lab., Ill.
SOLID FILM LUBRICANT SUBSTRATES.
by G. P. Murphy and F. S. Meade. 6 Feb 64, 20p
Proj. 1A024401A107
RIAL 64 1377

Unclassified report

Descriptors: (*Lubricants, Coatings), (*Corrosion inhibition, Lubrication), Films, Steel, Aluminum, Wear

function of biasing voltage at 35 Gc, (2) Insertion loss and phase shift as a function of sample temperature at 35 Gc, (3) Dielectric constant as a function of sample temperature at 0.5 Kc, 1 Kc, and 2 Kc, and (4) Quarter-wave transformer applications. The ferroelectrics studied include series of barium-strontium titanates, barium-strontium-nickel titanates and lead-strontium titanates, and single crystal triglycine sulfate.

AD-602 524 Div. 14, 17
OTS Prices: HC $2.00/MF $0.50

Rock Island Arsenal Lab., Ill.
EFFECT OF ELECTRICAL INSULATION MATERIALS ON PROTECTIVE METAL FINISHES UNDER CONDITIONS OF HEAT AND MOISTURE.
Technical rept.,
by W. F. Garland. 22 Aug 63, 28p
Proj. 1A0 13001A039
RIAL 64 728

Unclassified report

Descriptors: (*Organic materials, Electric insulation), (*Corrosion, Electric insulation), (*Electric insulation, Organic materials), Compatibility, Steel, Aluminum, Cadmium, Zinc, Protective treatments, Chromates, Coatings, Oxides, Vinyl plastics, Tapes, Varnishes, Environmental tests, Heat, Moisture, Paper, Electric wire.

An investigation was made of the effects of certain AIEE, Class O(90C) and A(105C) electrical insulation materials on protective metal finishes. Sleevings, tapes, varnishes, insulated wires, and insulation paper were evaluated in contact with and in confined close proximity to bare steel, uncoated aluminum, anodized aluminum, and cadmium and zinc (with and without chromate treatment). Temperatures and initial relative humidities utilized were 160±2F and 100% R.H., and 200±2F and 50% R.H. Sleeving materials in general were the most corrosive and insulated wires the least corrosive insulation material. Zinc with and without chromate treatment was most susceptible to corrosion by the insulation materials tested and anodized aluminum the least affected metal. The greatest amount of corrosion occurred at a test temperature of 200F. (Author)

AD-602 530 Div. 14, 4
OTS Prices: HC $1.00/MF $0.50

FMC Corp., Princeton, N. J.
QM ELASTOMER CONTRACT.
Progress rept. no. 2, 27 Sep-26 Dec 63,
by J. A. Gannon. 9 Jan 64, 14p PCR349
Contract DA19 129AMC147N, Proj. B132

Unclassified report

Descriptors: (*Elastomers, Synthesis (Chemistry)), Fluorocarbons, Nitrogen, Chemical reactions, Fluorine, Polymers, Sulfur, Oxygen, Aromatic compounds, Siloxanes, Alkyl radicals, Rubber, Synthetic rubber, Low-temperature research, High-temperature research.

Reaction of dimethylchlorosilane with 3, 4, 4 Trifluoro-4-bromo-3-chlorobutene-1 on a 0.5 mol scale at 75C. in the presence of chloroplatinic acid catalyst provided a 44% conversion to the adduct, C1-Si(CH3)2CH2 CH2 CFC1CF2Br. Repetition of the reaction on a 5 mol scale was started and the product obtained will be hydrolyzed and dehalogenated to form the desired disiloxane monomer, (CF2= CFCH2CH2Si(CH3)2)2-O-. (Author)

AD-602 584 Div. 14, 17
OTS Prices: HC $7.53/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
USE OF POLYMERS IN ANTICORROSION TECHNOLOGY.
by I. Ya. Klinov and P. G. Udyma, eds. 20 Apr 64, 453p
FTD MT63 54, TT 64 11955

Unclassified report

Edited machine trans. of mono. Primenenie Polimerov v Antikorrozionnoi Tekhnike, Moscow, 1962, 319p.

Descriptors: (*Corrosion inhibition, Plastic coatings), (*Plastic coatings, Corrosion inhibition), Paints, Silicone plastics, Polyethylene plastics, Rubber coatings, Halocarbon plastics, Graphite, Glass textiles, Binders, Furan resins, Fibers (Synthetic), Epoxy plastics, Bituminous coatings, Thermoplastics, USSR.

Data are listed on protection of metals from corrosion by polymeric materials and methods of their application. Recommendations are given on application of new polymeric materials in anticofrosion technology as replacements of painted and other damaged metals in various branches of national economy. (Soviet editor's note)

AD-602 606 Div. 14, 26
OTS Prices: HC $1.00/MF $0.50

National Carbon Co., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. SUPPLEMENT TO VOLUME XIII. DEVELOPMENT OF A FINE-GRAIN ISOTROPIC GRAPHITE FOR STRUCTURAL AND SUBSTRATE APPLICATIONS.
Rept. for Sep 62-May 63,
by R. A. Howard and R. L. Racicot. May 64, 25p
Contract AF33 616 6915, Projs. 7350, 7381,
Tasks 735002, 738102
WADD TR61 72 V13, suppl.

Unclassified report

Descriptors: (*Graphite, Physical properties), (*Refractory materials, Graphite), Pressure, Silicon compounds, Carbides, Oxidation, Aging (Materials), Manufacturing methods, Stresses, Ceramic coatings, Asphalt, Structural properties, Isotropism, High-temperature research, Mechanical properties, Environmental tests.

The characterization of grade RVC graphite and the process and blend variations which were studied in the fabrication of substrate-type graphite are described. Present trials show that a forming pressure of 900 lbs./sq. in., instead of the 1000 lbs. /sq. in. as used previously, would increase the yield of grade RVC and not significantly change the properties of the material. Furthermore, these trials show that various other blends will also produce a substrate graphite suitable for silicon carbide coating. (Author)

AD-602 607 Div. 14
OTS Prices: HC $9.94/MF $3.00

National Carbon Co., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXVI. PHYSICAL PROPERTIES OF SOME NEWLY DEVELOPED GRAPHITE GRADES.
Rept. for 1 May 60-30 Apr 63,
by R. B. Dull. May 64, 694p

required to convert these liquids to coke and graphite in the pores of the base materials is discussed. The purpose of the impregnation process is to increase the strength and density and decrease the porosity of the finished articles. Impregnation procedures, the natures of the impregnants, and base stock structure affect the physical properties of impregnated graphite. Mercury porosimetry is used to define the pore structure of the bodies to be impregnated and aid in selection of impregnant and impregnating procedure. The physical properties of the impregnated graphite are related to the performance of nozzle inserts in a sub-scale solid propellant rocket motor. (Author)

AD-602 745 Div. 14, 4
OTS Prices: HC $2.00/MF $0.50

Houghton (E.F.) and Co., Philadelphia, Pa.
DEVELOPMENT OF FIRE RESISTANT WATER BASED HYDRAULIC FLUIDS.
Bimonthly rept. no. 2,
by Philip Rakoff, G. John Colucci, and Robert K. Smith.
27 Jul, 64, 26p
Contract NObs90269

Unclassified report

Descriptors: (*Hydraulic fluids, Lubricants), (*Lubricant additives, Glycols), (*Glycols, Water), Flammability, Synthesis (Chemistry), Temperature, Ignition, Solubility, Viscosity, Phosphorus compounds, Nitrogen compounds, Chlorine compounds, Boron compounds.

Water soluble compounds were synthesized which contain phosphorous, nitrogen, chlorine or boron in the molecule. It has been established, through the years, that these elements are among the few needed to impart fire resistance in many hydraulic systems. These materials were evaluated by themselves and in a prototype water-glycol base essentially for flash point, fire point, autogenous ignition temperature, solubility and viscosity increasing tendency. Autogenous ignition temperatures of over 1000F were observed when as little as 4 percent of a borate additive was incorporated. (Author)

AD-602 747 Div. 14, 10
OTS Prices: HC $3.00/MF $0.75

Central Laboratory, T. N. O., Delft (Netherlands).
MECHANICAL PROPERTIES OF HIGHLY FILLED ELASTOMERS III. INFLUENCE OF PARTICLE SIZE AND CONTENT OF FILLER ON THERMAL EXPANSION AND BULK MODULI.
Technical rept. no. 3,
by F. R. Schwarzl. Jun 64, 93p CL64 49
Contracts N62558 3581, N62558 3884

Unclassified report

Descriptors: (*Elastomers, Mechanical properties), (*Isocyanate plastics, Composite materials), (*Composite materials, Mechanical properties), Thermal expansion, Thermal stresses, Shear stresses, Sodium compounds, Chlorides, Isotropism, Laboratory equipment, Transition temperature, Glass, Equations, Frequency, Deformation, Volume, Experimental data, Propagation, Test methods, Solid rocket propellants, Ammonium compounds, Perchlorates.

Model substances were prepared of a polyurethane rubber filled with different amounts of various fractions of sodium chloride. Eight filler fractions were used with sizes between 1 micron and 480 micron. The amount of filler was varied between 0 and 50 per cent. by volume. An experimental method is described, by which thermal expansion and bulk modulus of an isotropic material may be simultaneously determined as functions of temperature. The materials were investigated for thermal expansion and bulk modulus. All filled and unfilled samples show a glass-rubber transition, at which temperature the thermal expansion coefficient increases considerably and the bulk modulus decreases sharply. These temperatures do not depend on amount or size of filler. The levels of the bulk moduli and the thermal expansion coefficients are independent of filler size, but depend considerably on the amount of filler. These levels may be predicted by means of a simple macroscopic theory (Frohlich-Sack-Van der Poel), describing the bulk modulus, the thermal expansion and the density of the composite material in terms of the corresponding properties of the components and of their relative amounts. (Author)

AD-602 750 Div. 14, 4, 22
OTS Prices: HC $3.00/MF $0.75

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
CELLULOSE NITRATE-ACETATE MIXED ESTERS.
by Yvon P. Carignan and Jack Bobinski. Jun 64,
86p
Proj. 5 1304 21 008
PA TR3105

Unclassified report

Descriptors: (*Cellulose acetates, Nitration), (*Nitrocelluse, Acetylation), Esters, Synthesis (Chemistry), Polymerization, Molecular structure, Films, Moisture, Tensile properties, Impact shock, Pyrolysis, Explosion effects, Decomposition, Propellants, Cartridge cases.

A preliminary investigation of the preparation and properties of cellulose nitrate-acetate mixed esters was conducted. These mixed esters can be prepared in a wide range of amounts of substitution of both acetate and nitrate groups either through acetylation of cellulose nitrate or nitration of cellulose acetate. The degree of polymerization of the products, as estimated from viscosity data, shows the occurrence of chain degradation for both procedures. The hygroscopicity of the cellulose nitrate-acetate esters was found to be a linear function of total substitution. Films prepared from these mixed esters showed tensile strength at least comparable to that of films of cellulose nitrate or cellulose acetate. The impact sensitivity of the mixed esters varied from 6 to 18 inches for a 2-kilogram weight depending on the substitution of nitrate groups. Under the conditions of the explosion temperature test, the mixed esters decomposed violently without igniting. However, the minimum decomposition temperature appears to be the same as for similarly substitued cellulose nitrate. (Author)

AD-602 767 Div. 14, 25
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XL. THE INFLUENCE OF FILLERS ON THE PYROLYSIS AND BONDING CHARACTERISTICS OF CERTAIN SYNTHETIC BINDERS.
Rept. for Nov 60-31 Mar 63,
by C. W. Boquist, H. J. O'Neil, R. E. Putcher, and J. S. Griffith. May 64, 70p
Contract AF33 616 6915, Projs. 7350, 7381,
Tasks 735002, 738102
WADD TR61 72 V40

Unclassified report

Descriptors: (*Graphite, Physical properties), (*Pyrolysis, Binders), (*Binders, Physical properties), Aluminum compounds, Oxides, Plastics, Alcohols, Carbon, Chromatographic analysis, Thermal properties, Ultraviolet spectroscopy, Temperature, Gases, Chemical properties, Chemical bonds, Degredation, Density, Elasticity, Viscosity, Aromatic compounds, Polymers.

resistance, Life expectancy, Sea water, Army equipment, Protective treatments, Specifications, Sprays, Aging (Materials).

A comparison of the wear life and corrosion protective ability of RIA Compound 9A and two MIL-L-8937(ASG) solid film lubricants applied to various substrates was made. The substrates used were (1) grit blasted steel, (2) zinc phosphatized grit blasted steel, (3) zinc phosphatized cadmium plated steel and (4) sulphuric acid anodized and water sealed aluminum. The following conclusions are drawn from this investigation (1) RIA Compound 9A is superior to the two qualified MIL-L-8937(ASG) lubricants. (2) Corrosion products formed in a salt fog environment do not substantially reduce the lubricating ability of RIA Compound 9A when applied to zinc phosphatized steel, (3) For maximum corrosion protection, sulphuric acid anodized aluminum, water sealed after anodizing, is the best substrate for solid film lubricant coatings. (4) For maximum wear life, zinc phosphatized steel is the best substrate for solid film lubricant coatings. (5) RIA Compound 9A is the only coating examined whose wear life is not significantly reduced by an operating temperature of 400F. (Author)

AD-602 727 Div. 14
OTS Prices: HC $3.00/MF $0.50

Purdue Research Foundation, Lafayette, Ind.
PROTECTIVE COATINGS FOR CONCRETE,
by W. L. Dolch. Sep 63, 57p
Contract DA33 017CIVENG63 6
ORDL-EC TR2 29

Unclassified report

Descriptors: (*Coatings, Protective treatments), (*Concrete, Moistureproofing), Paints, Plastic paints, Bituminous coatings, Epoxy plastics, Silicones, Solvents, Colloids, Surfaces, Reviews, Bibliographies.

A review of some aspects of protective coatings, (97 refs.) for concrete comprising a selected bibliography with brief annotations and a summary of the state of the art as revealed by the references cited. The report is concerned chiefly with coatings that have been used to protect concrete from water ingress. Basic principles of waterproofing and dampproofing are discussed. Protective coatings are classified into seven categories, i.e., cement-base paints, solvent-thinned paints, emulsion paints, bituminous coatings, silicones, epoxy and related coatings, miscellaneous coatings, and each class is discussed separately. (Author)

AD-602 735 Div. 14, 26, 22
OTS Prices: HC $4.00/MF $0.75

National Carbon Co., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME IX. FABRICATION AND PROPERTIES OF CARBONIZED CLOTH COMPOSITES.
Rept. for Sep-60-Dec 62,
by W. C. Beasley, E. R. McHenry, and E. L. Piper.
May 64, 116p
Contract AF33 616 6915, Projs. 7350, 7381,
Tasks 735002, 738102
WADD TR61 72 V9

Unclassified report

Descriptors: (*Graphite, Composite materials), (*Composite materials, Physical properties), (*Manufacturing methods, Composite materials), (*Refractory coatings, Rocket motors), Carbon, Textiles, Laminates, Heat treatment, High-temperature research, Tensile properties, Elasticity, Deformation, Fracture (Mechanics), Plastics, Aging (Materials), Enviromental tests, Resistance (Electrical), Tungsten, Tantalum, Thermal stresses.

The development of fibrous, carbonaceous composites and laminates is described. Graphite, carbon, and heat-treated cloth and graphite and carbon felts are evaluated as fillers. Physical properties of the carbonized and graphitized forms of these materials are tabulated. Test results of these materials as potential hardware components are presented. (Author)

AD-602 736 Div. 14, 26, 22
OTS Prices: HC $2.00/MF $0.50

National Carbon Co., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. SUPPLEMENT TO VOLUME XII. DEVELOPMENT OF AN IMPROVED LARGE DIAMETER, FINE GRAIN GRAPHITE FOR AEROSPACE APPLICATIONS.
Rept. for Sep 62-May 63,
by R. L. Racicot and C. W. Waters. May 64, 42p
Contract AF33 616 6915, Projs. 7350, 7381,
Tasks 735002, 738102
WADD TR61 72 V12, suppl.

Unclassified report

Descriptors: (*Graphite, Composite materials), (*Composite materials, Physical properties), (*Manufacturing methods, Composite materials), (*Aerospace craft, Composite materials), Porosity, Density, Strength, Fracture (Mechanics), Industrial equipment, Pressure, Aging (Materials), Heat treatment, Chemical properties, Structural properties, Elasticity, Extrusion, Surface area, Temperature, Resistance (Electrical), High-temperature research.

Continuation of development work on large diameter grade RVA graphite is discussed. The extension work consisted primarily of fabricating and evaluating raw materials for use as the inert filler in RVA blends, and of attempts to scale up to longer lengths of RVA graphite. Significant properties of raw materials, as they affect the final properties of grade RVA graphite, were the total porosity and kerosene apparent density. The more porous raw materials imparted higher strength to the finished RVA graphite, whereas those of higher density contributed to higher density of the finished graphite. Long lengths of 33-inch diameter RVA graphite were difficult to process without cracking. The longest length processed successfully under this project was 45 inches. (Author)

AD-602 737 Div. 14, 26, 22
OTS Prices: HC $3.00/MF $0.75

National Carbon Co., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXXI. IMPREGNATION OF GRAPHITE.
Rept. for Oct 61-May 63,
by C. E. Waylett, M. B. Carter, and M. A. Spring.
May 64, 68p
Contract AF33 616 6915, Projs. 7350, 7381,
Task 735002, 738102
WADD TR61 72 V31

Unclassified report

Descriptors: (*Graphite, Impregnation), (*Carbon,x Impregnation), (*Composite materials, Physical properties), (*Manufacturing methods, Composite materials), (*Rocket motor nozzles, Graphite), Liquids, Heat treatment, Porosity, Density, Structural properties, Elasticity, Plastics, High-temperature research, Permeability, Resistance (Electrical), Tensile properties, Thermal properties, Erosion, Thermoplastics.

The impregnation of carbon and graphite materials with carbonaceous liquids and the subsequent heat treatment

AD-602 923 Div. 14, 4
OTS Prices: HC $2.00/MF $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
PAINT STRIPPER FOR USE ON MILD STEEL AND ALUMINUM,
by Joseph T. Crockett. 25 Feb 64, 38p
Proj. I H O 24401A110 05
CCL 159

Unclassified report

Descriptors: (*Paint removers, Carboxylic acids), (*Carboxylic acids, Paint removers), Solvents, Organic solvents, Corrosion inhibition, Penetration, Paints, Surface area, Steel, Aluminum, Military requirements, Effectiveness, Tests.

The object is the development of a paint remover suitable for use on any type of orgainic coating over any metal. This report covers Phase 1 of this project, to formulate a paint remover that would loosen all paints and related films from mild steels and aluminum. The second object of Phase 1 required that the formulated paint remover be quick acting, highly efficient, and that it penetrate multilayer coatings and small crevices or fissures that are filled with paint. All the objectives of Phase 1 have been achieved. It is recommended that test methods be devised to insure procurement of this paint remover and that a procurement specification be written. It is also recommended that modifications be attempted for the purpose of extending this paint remover for use on magnesium. (Author)

AD-602 931 Div. 14, 13
OTS Prices: HC $1.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
EVALUATION OF ASBESTOS ASPHALT PAVING MIXES.
Final rept.,
by J. A. Bishop. 29 Jun 64, 45p
Proj. Y F015 15 01 122
NCEL R318

Unclassified report

Descriptors: (*Pavements, Composite materials), (*Asphalt, Pavements), (*Asbestos, Pavements), Runways, Binders, Tensile properties, Compressive properties, Deformation, Aging (Materials), Environmental tests, Additives, Limestone.

An experiment was conducted to determine the effect on strength properties of adding asbestos fibers to asphalt paving mixtures. Beams, cylinders, and tensile briquets were molded with various percentages of asbestos (up to 2 percent) in combination with other fillers and a constant percentage of asphalt. Specimens were tested at the age of 0 months and at 6 and 18 months (accelerated). Marshall specimens were made of the same mixes and tested as soon as molded. On the basis of a statistical analysis of the test results, strength properties did not improve enough to warrant further study. (Author)

AD-602 945 Div. 14, 25
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Schenectady, N. Y.
PREPARATION TECHNIQUES FOR GROWTH OF SINGLE-CRYSTALS OF NONMETALLIC MATERIALS.
Final rept., 1 Jun 63-31 May 64,
by E. M. Clausen and J. W. Rutter.
Jun 64, 34p R64GC0279M
Contract AF49 638 1247, ARPA Order447

Unclassified report

Descriptors: (*Single crystals, Crystal growth), (*Crystal growth, Single crystals), Heaters, Plasma jets, Zone melting, Oxides, Aluminates, Titanates, Aluminum compounds, Cobalt compounds, Nickel compounds, Yttrium compounds, Titanium compounds, Zirconium compounds, Magnesium compounds, Barium compounds, Garnet.

The report describes two techniques for growth of high-purity single crystals of nonmetallic materials using r-f induction-heating equipment in a frequency range of 5 to 100 Mc. One technique used for single-crystal growth was the Verneuil method using an induction-coupled plasma as a heat source instead of the conventional mixture of combustible gases. Materials that were melted in the plasma include Al_2O_3, $CoAl_2O_4$, NiO, Eu_2O_3-doped Y_2O_3, TiO_2, CaO stabilized ZrO_2, $MgAl_2O_4$, and MgO. Single crystals of $CoAl_2O_4$ were grown. The second crystal growth technique investigated was floating-zone melting using r-f induction heating. Materials that were directly r-f coupled and subsequently heated include NiO, TiO_2, $BaTiO_3$, CaO stabilized ZrO_2, $CoFe_2O_4$, and yttrium iron garnet (YIG). Molten zones were traversed through polycrystalline rods of $CoFe_2O_4$, YIG, and NiO with the majority of the work concentrated on NiO. The shape of the freezing liquid-solid interface appeared to be an important factor in crystal growth by this technique. (Author)

AD-602 984 Div. 14
OTS Prices: HC $3.00/MF $0.75

Monsanto Research Corp., Dayton, Ohio.
METHODS FOR PARTICLE COUNTING IN HYDRAULIC FLUIDS.
Rept. for Sep 61-Nov 63,
by Richard A. Anduze and Jay C. Harris. May 64, 66p
Contract AF33 616 8483, Proj. 7381, Task 738103
ML TDR64 72

Unclassified report

Descriptors: (*Hydraulic fluids, Impurities), (*Counting methods, Particles), Lubricants, Contamination, Particle size, Correlation techniques, Standards, Controlled atmospheres.

Four methods of sizing and counting particles in hydraulic fluids and lubricants were studied. The reproductibility of SAE Aeronautical Recommended Procedure No. 598 was established. Test results on three automatic particle counters: the Cintel Flying Spot Resolver, the Coulter Counter, and the HIAC Particle Counter were evaluated against the ARP No. 598. Instrument theory and test methods are described. Design and construction of a simple but effective dustless area are given. Two of the automatic counters were found to give counts well within the prescribed precision (±33%) of the ARP No. 598. Numerical differences in counts on the same sample are attributable to the measurement of different physical properties by the various methods. Correlations between counts were made. Precision of the HIAC Counter was established, with standard deviations of 4.1% for the total count, 3.3% in the 6-15 micron range, and 11.2% in the 16-25 micron range. (Author)

The research is concerned with the bonding and pyrolysis characteristics of two synthetic binders. The binders, alumina-condensed furfuryl alcohol resin and acenaphthylene pitch, were evaluated both by themselves and in conjunction with selected fillers to determine binder-filler interactions during pyrolysis and to develop a more complete understanding of the carbon bonding process. The data accumulated from a number of techniques are presented and interpreted. Pyrolysis and physical property data for specimens molded with both the resin and pitch binders are also presented. It has been found that some fillers are essentially unbondable by carbon, while others can materially alter binder pyrolysis. (Author)

AD-602 773 Div. 14
OTS Prices: HC $5.00/MF $1.00

Electronic Properties Information Center, Culver City, Calif.
BOROSILICATE GLASSES, DATA SHEETS,
by John T. Milek. Jun 64, 162p DS138
Contract AF33 615 1235, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Glass, Electrical properties), (*Silicon compounds, Glass), (*Boron compounds, Glass), Dielectric properties, Electrical corona, Resistance (Electrical), Sodium compounds, Chemical analysis, Data.

A compilation of the electrical properties of various borosilicate glasses is presented. Arrangement of the data sheets are by Corning code or number with a Master Identification Chart relating the known chemical composition of each glass. Detailed electrical properties include corona effects, dielectric constant, dielectric strength, dissipation factor, loss factor, power factor, surface and volume resistivity. Each property is compiled over the widest possible range of temperature and frequencies from references obtained in a thorough literature search. The structure, applications and phase diagrams are briefly reviewed. (Author)

AD-602 825 Div. 14
OTS Prices: HC $2.00/MF $0.50

Syracuse Univ., N. Y.
A STUDY OF THE EFFECT OF SUPERIMPOSED STRESS CONCENTRATIONS.
Rept. for 1 Apr 63-31 Mar 64,
by V. Weiss, A. Takimoto, and J. Sessler. Apr 64, 48p
Contract AF33 657 11154, Proj. 7350, Task 735003
ML TDR64 144
Unclassified report

Descriptors: (*Ceramic materials, Mechanical properties), Tensile properties, Shear stresses, Photoelasticity, Failure (Mechanics), Brittleness, Test methods, Aging (Materials), Calibration, Titanium alloys, Thermosetting plastics.

The effect of tensile stress fields due to holes, superimposed on the stress fields due to external notches, was investigated by means of photoelastic techniques and tensile fracture tests. A columbia resin photoelastic material, CR-39, and the titanium alloy 2.5Al-16V, aged to a brittle condition, were used to construct simple model systems for these studies, as a first step to simulate a prototype ceramic material. It was found that no significant degree of interaction occurred between the stress fields of holes and the stress field due to the notch. Although the holes produced considerable localized stress inhomogeneities, this effect did not extend to the root of the notch where the maximum stress was solely determined by the stress concentration factor of the notch. The results of the tensile fracture tests confirmed the stress field studies. It was concluded that elastic stress field equations of notches and holes provide a satisfactory means of estimating the earliest possible interaction of a stress raisers. (Author)

AD-602 894 Div. 14, 12, 26
OTS Prices: HC $3.00/MF $0.50

Lockheed Missiles and Space Co., Palo Alto, Calif.
PASSIVE THERMAL CONTROL COATINGS,
by J. E. Gilligan, M. E. Sibert and T. A. Greening.
1963, 56p Lock 5 10 63 9
Contracts AF04 647 787, AF04 695 136
Unclassified report

Rept. presented at Seventh Meeting of the Refractory Composites Working Group, Palo Alto, California, March 12-14, 1963.

Descriptors: (*Spacecraft, Thermal insulation), (*Coatings, Spacecraft), (*Thermal insulation, Optical coatings), Heat shields, Surfaces, Solar radiation, Thermal radiation, Ceramic coatings, Foils, Paints, Space environmental conditions, Silicon compounds, Oxides, Reflection, Aerodynamic heating, Stability, Alkali metals, Physical properties, Environment tests, Reflectors, Satellites (Artificial), Organic coatings, Flame spraying, Surface properties, Optical properties, Absorption, Composite materials.

Development of a unique class of coating material systems for passive temperature control surfaces is described. Certain alkali silicate-based all-inorganic coating systems offer considerable promise for current long-term applications in this area of space technology. The major objective of this program is the development of coating systems with stable alpha/epsilon values of less than 0.30 after 2,000 to 6,000 sun-hour exposures under space environmental conditions, with lesser emphasis in systems with alpha/epsilon values of up to 1.20. (Author)

AD-602 916 Div. 14, 4
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
OXIDATION RESISTANT HIGH TEMPERATURE PROTECTIVE COATINGS FOR TUNGSTEN.
Quarterly progress rept. no. 3, 15 Nov 63-15 Feb 64,
by H. J. Nolting. 15 Feb 64, 47p TRW TM-3890
Contract AF33 657 11151
NP 13898
Unclassified report

Descriptors: (*Tungsten, Refractory coatings), (*Refractory coatings, Silicon compounds), Low-pressure research, Heat-resistant materials, Coatings, Antioxidants, Sprays, Oxidation, Erosion, Tests.

Low pressure-high temperature characteristics of pre-oxidized (Si-W)-O coatings were found to be effected by the temperature of pre-oxidation. Coatings on W+(Si-W)-O systems, pre-oxidized under atmospheric conditions at 3000F, showed general deterioration after 1 hour exposure at 3400-3500F (corrected optical temperature) at a partial pressure (air) of 25 microns. W+(Si-W)-O coated systems, pre-oxidized at 3350F under atmospheric conditions, exhibited much less deterioration after low pressure exposure under the same conditions. W+Ti-Zr (Si-W) coated systems not converted prior to low pressure-high temperature exposure had less coating deterioration than either converted or converted and pre-oxidized W+Ti-Zr-(Si-W)-O systems. (Author)

by M. R. Elistratov. 18 Jun 64, 26p
FTD TT64 333; TT 64 11873

Unclassified report

Unedited rough draft trans. of Avtomatika i Telemekhanika (USSR) 1963, v. 24, no. 11, p. 1474-1486.

Descriptors: (*Control systems, Snythesis), (*Numerical analysis, Polynomials), (*Polynomials, Equations), Optimization, Dynamics, Errors, Statistical processes, Functions, Algebra, Automatic, USSR.

The problem was solved of calculating the optimal controller in a closed control system taking into account the preservation of the system coarseness. The following criteria of optimization were examined: the minimum of dispersion of the system random error under a given coefficient of dynamic error and the minimum of the sum error of conversion. The problem was solved with the aid of polynomial equations. (Author)

AD-602 348 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON DIFFERENTIABLE MAPPINGS,
by A. M. Rodniinskii. 12 Jun 64, 16p
FTD MT63 332; TT 64 11874

Unclassified report

Edited machine trans. of Aviatsionnyi Institut, Moscow. Trudy (USSR) 1956, v. 61, p. 58-66.

Descriptors: (*Algebraic topology, Mapping (Transformations)), (*Mapping (Transformations), Theorems), Algebraic geometry, Differential geometry, Set theory, Combinatorial analysis, Measure theory, Topology, USSR.

This article contains mathematical proofs of three theorems on differentiable mappings. Theorems 1 and 2 establish the character of behavior of a mapping near an individual point at which the Jacobian is not equal to zero. Theorem 3 asserts that if the Jacobian is positive (is negative) at some point, then it is positive (is negative) also on a set of positive size, and the image of this set is also set of positive size.

AD-602 371 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE APPLICATION OF THE ELIMINATION METHOD TO THE PROBLEM OF FINDING THE EIGENVALUES AND EIGENVALUES OF EIGENFUNCTIONS OF A LINEAR INTEGRAL OPERATOR WITH A SYMMETRIC KERNEL
by V. S. Shishov. 10 Jun 64, 22p
FTD MT63 303, TT 64 11879

Unclassified report

Edited machine trans. of Zhurnal Vychislitel'noi Matematiki i Matematicheskoi Fiziki (USSR) 1962, v. 2, no. 3, p. 398-410.

Descriptors: (*Matrix algebra, Number theory), (*Integral transforms, Theory), (*Operators (Mathematics), Numerical analysis), Functions, Integrals, Series, Integral equations, Algebra, Numerical methods and procedures, Taylor's series, USSR.

AD-602 387 Div. 15
OTS Prices: HC $2.00/MF $0.50

Anti-Submarine Warfare Lab., Naval Air Development Center, Johnsville, Pa.
UTILIZATION OF A CONFORMAL MAPPING TRANSFORMATION FOR DIGITAL COMPUTATION.
Technical note,
by E. M. Goldberg. 28 May 64, 31p
NADC-AW N6307

Unclassified report

Descriptors: (*Conformal mapping, Transformations (Mathematics)), (*Programming (Computers), Transformations (Mathematics)), Mapping (Transformations), Integral transforms, Algebraic geometry, Geometric forms, Geometry, Digital computers.

A procedure was developed, based on conformal mapping techniques, for efficiently determining the points of intersection of conic sections. (The computational simplifications introduced were effected by a methodology which may be construed as the geometrical analogue of operational calculus techniques.) The heuristic approach was pursued throughout. (Author)

AD-602 396 Div. 15, 26
OTS Prices: HC $4.00/MF $0.75

Copenhagen Univ. (Denmark).
BAYESIAN SINGLE SAMPLING ATTRIBUTE PLANS FOR DISCRETE PRIOR DISTRIBUTIONS.
Technical rept. no. 5,
by A. Hald. Jun 64, 124p
Contract N62558 3073, Proj. NR042 225

Unclassified report

Descriptors: (*Sampling, Statistical distributions), (*Statistical distribution, Sampling), Binomials, Statistical analysis, Economics, Quality control, Costs.

The main purpose of the paper was to give a rather complete tabulation and discussion of properties of a system of single sampling attribute plans obtained by minimizing average costs under the assumptions that costs are linear in p, the fraction defective, and that the distribution of lot quality is a double binomial distribution. Starting from a cost function containing 6 parameters and a mixed binomial prior distribution it was shown how the average costs may be written in a standard form containing only two parameters, p sub r and p sub s, besides the parameters defining the prior distribution. The one parameter, p sub r, is the economic break-even quality and depends on the costs of acceptance and rejection only, whereas the second parameter, p sub s also depends on the costs of sampling inspection and the average quality. In a simple and practically important case p sub r and p sub s denote the costs of rejection and the costs of sampling inspection, respectively, divided by the costs of accepting a defective item. (Author)

AD-602 399 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE PRESENTATION OF ELEMENTS OF SYSTEMS OF COLLINEATIONS OF THE SECOND THIRD DEGREE AS PRODUCTS OF TWO POLAR CORRESPONDENCES AND ON CERTAIN PROPERTIES OF COLLINEATIONS, CONNECTED WITH THIS QUESTION,
by V. A. Manevich. 24 Jun 64, 17p
FTD MT63 317; TT 64 11887

Unclassified report

Edited machine trans. of Matematicheskii Sbornik (USSR) 1957, v. 41(83) no. 2, p. 221-230.

Descriptors: (*Mapping (Transformations), Projective

15. Mathematics

AD-602 316 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE INSOLUBILITY OF CERTAIN TOPOLOGICAL PROBLEMS,
by A. Markov. 12 May 64, 10p
FTD TT64 466, TT 64 11851

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1958, v. 123, no. 6, p. 978-980.

Descriptors: (*Topology, Theorems), Combinatorial analysis, Complex variables, Binary arithmetic, Mathematics, USSR.

This memorandum is devoted to intensification and structural perfection of results previously formulated, pertaining, to the problem of homemorphism of polyhedrals and designated by schemes of their triangulations. The bases of purely combinational theory of complexes and the concept of combinatorial Equivalence of complexes are discussed.

AD-602 324 Div. 15, 8, 30
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
MODULES OF COHERENT BINARY SYSTEMS,
by Z. W. Birnbaum and J. D. Esary. Apr 64, 36p
D1 82 0344, Boeing Math345

Unclassified report

Also available from the authors.

Descriptors: (*Algebra, Set theory), (*Set theory, Algebra), (*Binary arithmetic, Model theory), Modules (Electronic), Reliability (Electronic), Electrical networks, Computer logic, Digital systems, Mathematical models, Vector analysis, Special functions (Mathematical).

The concept of a 'module', i.e. a package of components of a system which can be removed and replaced as a whole, has been long in use in systems design and analysis. In this paper a formal definition of this concept is given and its properties are studied. Most of the results are obtained for 'coherent' systems, i.e. for systems whose performance improves as the performance of their components improves. For such systems the relationship between modules and minimal paths can be fully clarified, and the results obtained lead to a criterion for deciding whether or not a given set of components constitutes a module of a given system. It is shown that a coherent system always has uniquely determined maximal modules which have the property that either all are disjoint or no two of them are disjoint. These maximal modules determine uniquely a decomposition of the system into disjoint modular factors. Furthermore, a theorem on the union of modules (the 'three modules theorem'), which has been previously known for general systems, is obtained by a rather simple argument for coherent systems. (Author)

AD-602 329 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE RIESZ REPRESENTATION THEOREM,
by Richard Bellman. Jul 64, 8p RM-4149PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Calculus of variations, Functional analysis), (*Functional analysis, Calculus of variations), Functions, Theorems, Mapping (Transformations).

A variational technique is used to obtain a short proof of a famous result of F. Riesz. (Author)

AD-602 341 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE THEORY OF OPERATOR COMPUTATION,
by V. A. Ditkin. 14 May 64, 8p
FTD TT64 325; TT 64 11867

Unclassified report

Unedited rough draft trans. of A[kademiya] N[auk] SSSR. Doklady, 1957, v. 116, no. 1, p. 15-17.

Descriptors: (*Integral transforms, Theory), (*Operators (Mathematics), Theory), Integration , Functions, Theorems, Integrals, USSR.

This work considers the application of Mikusinski's theory in operator computation.

AD-602 344 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOLUTION OF THE FIRST BOUNDARY VALUE PROBLEM FOR ELLIPTICAL EQUATIONS BY MEANS OF NETS,
by D. P. Grossman. Jun 64, 10p
FTD mt63 329; TT 64 11870

Unclassified report

Edited machine trans. of A[kademiya] N[auk] SSSR. Doklady, 1956, v. 106, no. 5, p. 770-772.

Descriptors: (*Boundary value problems, Partial differential equations), (*Partial differential equations, Boundary value problems), (*Numerical analysis, Algebra), Equations, Iterative methods, Series, Real numbers, Differential geometry.

AD-602 345 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE CALCULATION OF EIGENVALUES OF THE LAPLACE OPERATOR BY THE METHOD OF GRIDS,
by D. P. Grossman. 12 Jun 64, 10p
FTD MT63 328; TT 64 11871

Unclassified report

Edited machine trans. of A[kademiya] N[auk] SSSR. Doklady, 1956, v. 106, no. 4, p. 595-597.

Descriptors: (*Integral transforms, Theory), (*Operators (Mathematics), Number theory), (*Numerical analysis, operators (Mathematics)), Polynomials, Matrix algebra, Topology, Vector analysis, Numerical methods and procedures, USSR.

AD-602 347 Div. 15, 30
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONSIDERING THE SYNTHESIS OF DISCRETE SYSTEMS BY THE METHOD OF POLYNOMIAL EQUATIONS,

Descriptors: (*Dynamic programming, Linear programming), (*Linear programming, Dynamic programming), Operations research, Mathematical programming, Sequences, Functions, Calculus of variations, Transformations (Mathematics), Equations, Management engineering.

This memorandum indicates a method for treating the problem of minimizing a type of function that frequently arises in scheduling and organization theory. The technique presented here transforms the problem into a dynamic programming one, which can often be readily resolved computationally. (Author)

AD-602 480 Div. 15, 12
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angles, Calif.
THE EFFECTS OF STATE VARIABLE DISCONTINUITIES IN THE SOLUTION OF VARIATIONAL PROBLEMS,
by Rollyn G. Graham. 7 Jul 64, 34p TDR-269 4550 20 4
Contract AF04 695 269
SSD TDR64 142

Unclassified report

Descriptors: (*Calculus of variations, Theory), Differential equations, Applied mathematics, Engineering, Guided missile trajectories, Optimization, Staging.

Some necessary, but not sufficient, conditions for an extremal solution are developed for two types of variational problems in which state variable discontinuities are permitted. The types of problems are characterized by the fact that the magnitudes of the discontinuities are defined by specified relationships. The necessary conditions result in discontinuities in the Lagrange multipliers at the points of discontinuity in the state variables. Steepest-ascent methods are described for solving problems which occur in engineering practice. Two analytical example problems, one with both the magnitude and occurrence of the discontinuity defined and one with only the magnitude defined, are presented and solved by the indirect methods of the calculus of variations. (Author)

AD-602 568 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONCERNING METHODS OF REFINEMENTS BY DIFFERENCES OF HIGHER ORDER AND H2-EXTRAPOLATION,
by E. A. Volkov. 5 Mar 64, 12p
FTD MT63 221; TT 64 11936

Unclassified report

Edited machine trans. of A[kademiya] N[auk] SSSR. Doklady, 1963, v. 150, no. 3, p. 455-458.

Descriptors: (*Boundary value problems, Numerical analysis), (*Difference equations, Boundary value problems), (*Numerical analysis, Mathematical prediction), Iterative methods, Theorems, Rectangular bodies, USSR.

In this note, a method of refinements by differences of higher orders of the solution of the mixed boundary value problem for the Poisson equation in the rectangle is carried out, and a theorem is presented giving the basis of this method.

AD-602 575 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
WORKS ON THEORY OF FUNCTIONS OF COMPLEX VARIABLE,
by N. N. Luzin. 4 May 64, 11p
FTD MT63 299; TT 64 11943

Unclassified report

Edited machine trans. of Uspekhi Matematicheskikh Nauk (USSR) 1952, v. 7, no. 2 [48] p. 3-6.

Descriptors: (*Bibliographies, Functions), (*Complex variables, Functions), (*Functions, Complex variables), Taylor's series, Conformal mapping, Set theory, Mapping (Transformations), Theorems, Real variables, Differential geometry, Projective geometry, USSR.

AD-602 576 Div. 15, 31
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT ONE GEOMETRIC METHOD OF FORMATION OF TECHNICAL FORMS OF SURFACES,
by I. I. Kotov. 4 May 64, 14p
FTD MT63 315, TT 64 11944

Unclassified report

Edited machine trans. of Nauchnye Doklady Vysshei Shkoly. Mashinostroenie i Priborostroenie (USSR) 1958, no. 3, p. 108-113.

Descriptors: (*Drafting, Analytic geometry), (*Projective geometry, Drafting), Differential geometry, Engineering, Construction, Structures, Geometric forms, USSR.

AD-602 578 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FORMULAS FOR THE CALCULATION OF THE DETERMINANT OF A SQUARE MATRIX OF ONE PARTICULAR FORM,
by V. Ya. Natanzon. 4 May 64, 9p
FTD MT63 307; TT 64 11946

Unclassified report

Edited machine trans. of Prikladnaya Matematika i Mekhanika (USSR) 1957, v. 21, no. 4, p. 593-595.

Descriptors: (*S-matrix, Determinants), (*Determinants, Matrix algebra), Transformations (Mathematics), Number theory, Sequences, USSR.

AD-602 579 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NONLINEAR CONFLUENCE ANALYSIS,
by N. P. Klepikov and S. N. Sokolov. 7 May 64, 10p
FTD MT63 331, TT 64 11947

Unclassified report

Edited machine trans. of Teoriya Veroyatnostei i Ee Primeneniya (USSR) 1957, v. 2, no. 4, p. 473-475.

Descriptors: (*Statistical analysis, Curve fitting), (*Curve fitting, Statistical analysis), Probability, Statistical functions, Statistical distributions, Integrals, Experimental data, Errors, USSR.

geometry), (*Projective geometry, Mapping (Transformations)), Algebraic topology, Geometric forms, Transformations (Mathematics), Differential geometry, Conical bodies, USSR.

This work consists of two parts. Part I is concerned with investigating the possibility of presenting any collinear correspondence on a plane in the form of the product of two correlations (Polar correspondences). Some properties of collineation are listed. Part 2 is devoted to resolution of the problem about presentation of collineation in space in the form of the product of two polar correspondences. Certain questions connected with resolution of this problem are answered.

AD-602 400 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABSOLUTE INVARIANCE AND INVARIANCE TO€ IN THE THEORY OF DIFFERENTIAL EQUATIONS, III,
by N. N. Luzin and P. I. Kuznetsov. 30 Jun 64, 7p
FTD MT63 325, TT 64 11888
Unclassified report

Edited machine trans. of A[kademiya] N[auk] SSSR. Doklady, 1951, v. 80, no. 3, p. 325-327.

Descriptors: (*Invariance, Theorems), (*Differential equations, Theory), Functions, Complex variables, Real numbers, Inequalities, Polynomials, Number theory, USSR.

AD-602 402 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A ONE-PARAMETER FAMILY OF STRATIFIABLE ORTHOGONAL PAIRS,
by N. I. Alekseev. 15 Jun 64, 15p
FTD MT63 334; TT 64 11890
Unclassified report

Edited machine trans. of Aviatsionnyi Institut, Moscow. Trudy (USSR) 1956, v. 61, p. 20-29.

Descriptors: (*Differential geometry, Theory), Geometric forms, Theorems, Differential equations, Integration, Algebraic geometry, Trigonometry, USSR.

AD-602 403 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OPTIMAL CONTROL WITH RANDOM LOAD,
by N. N. Krasovskii. 24 Jun 64, 17p
FTD MT64 20, TT 64 11891
Unclassified report

Edited machine trans. of Sibirskii Matematicheskii Zhurnal (USSR) 1963, v. 4, no. 3, p. 622-631.

Descriptors: (*Control systems, Statistical functions), (*Statistical functions, Control systems), Optimization, Partial differential equations, Probability, Dynamic programming, USSR.

In the article is studied the problem of forming the manipulated variable of a controller under the condition of minimum of some index of quality of the controlled process. This index is determined by the functional, given on a limited section of the controlled motion. The considered system is subjected to a load, described as a Markov random of time function, and to interference. Optimal control is formed by measurement of realized values of the regulated quantity and the load. For a linear system carrying out a minimum of the quadratic functional, is given an obvious form of optimal control. The problem is solved by a method based on Lyapunov functions taking into account the principles of dynamic programming. (Author)

AD-602 408 Div. 15, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND ILL-CONDITIONED LINEAR SYSTEMS II,
by R. Bellman, R. Kalaba, and J. Lockett. Jul 64, 21p RM-4201-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Dynamic programming, Linear programming), (*Linear programming, Dynamic programming), Operations research, Mathematical programming, Sequences, Functions, Equations, Complex variables, Matrix algebra, Calculus of variations.

The aim of this memorandum was to show how an ill-conditioned linear system Ax = y, can be solved. Realizing that there exists a certain degree of smoothness in the solution, and attempt was made to determine x by minimizing, for appropriate values of lambda, the form (ax-y, ax-y) + lambda D sub N (x). This was done in a sequential fashion, using dynamic programming, so that no matrix inversions were required.

AD-602 459 Div. 15, 30, 32
OTS Prices: HC $2.00/MF $0.50

Cowles Foundation for Research in Economics, Yale Univ., New Haven, Conn.
A DECOMPOSITION ALGORITHM FOR QUADRATIC PROGRAMMING,
by Andrew Whinston. 25 Jun 64, 27p Cowles DP172
Contract Nonr3055 01, Proj. NR047 006
Unclassified report

Descriptors: (*Quadratic programming), Linear programming), (*Linear programming, Quadratic programming), Operations research, Mathematical programming, Functions, Matrix algebra, Calculus of variations, Equations, Decision theory, Economics.

This paper presented one possible approach to solving a convex quadratic programming problem where the number of constraints is large, but of a special structure. In a problem with a large number of constraints a direct approach may be impossible since the size of the initial basis matrix would cause difficulty in determining its inverse. While in the present algorithm the dimensionality may increase one may always obtain, at worst, approximate solutions. (Author)

AD-602 474 Div. 15, 26, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN APPLICATION OF DYNAMIC PROGRAMMING TO LOCATION-ALLOCATION PROBLEMS,
by Richard Bellman. Jul 64, 11p RM-4115PR
Contract AF49 638 700 Unclassified report

Technical note,
by R. C. Gulezian. 15 Jun 64, 23p
Task. FR70 4 01
NADC-AC 6409

Unclassified report

Descriptors: (*Harmonic analysis, Statistical analysis), (*Statistical analysis, Harmonic analysis), Time, Series, Least squares method, Statistical tests, Mathematical models, Monte Carlo method, Probability, Stochastic processes.

This technical note discusses some very basic notions concerning the applicability of statistics to the analysis of stationary time series. The purpose of the note is to provide an introduction to the subject at an elementary level. The problems of parameter estimation and hypothesis testing for a very simple form of a basic mathematical model are considered. While the model discussed is extremely simple, the statistical problems arising in its use are the statistical problems of all harmonic analysis, and the results obtained extend to the more general model. By keeping the model simple, focus was on the main issues, the goals and methods of harmonic analysis. Topics covered are: Least squares estimation; A test for periodicity, Another test for the largest intensity; A test for the magnitude of the intensity; and Testing for the Whiteness of Normal Noise.

AD-602 710 Div. 15
OTS Prices: HC $3.00/MF $0.75

Applied Logic Corp., Princeton, N. J.
AUTOMATED LOGIC FOR SEMI-AUTOMATED MATHEMATICS.
Scientific rept. no. 1,
by James R. Guard. 30 Mar 64, 68p
Contract AF19 628 3250, Proj. 5632, Task 563205
AFCRL 64 411

Unclassified report

Descriptors: (*Mathematical logic, Theorems), (*Programming (Computers), Mathematical logic), Automatic, Real time, Operators (Mathematics), Metamathematics, Computer personnel, Computers.

This report defines and describes six formal systems of logic, S sub 1 through S sub 6, for which proof procedures or partial proof procedures are readily contrived. The systems S sub 1 through S sub 4 are considered in order to simplify the descriptions of S sub 5 and S sub 6. System S sub 1 is a fragment of the classical propositional calculus whose theorems are those tautologies which can be shown tautologous by assuming them to take on the value falsehood and arriving at an inconsistent assignment to the variables by not using any 'branching' rules. This system suggests an efficient means of handling the propositional connectives in the later systems. System S sub 2 is the completion of S sub 1. S sub 2 has 'branching' rules which correspond to treating certain propositional variables by cases. This differs from Gentzen's treatment by Sequenzen in that Gentzen's 'branching' rules consider the value of the antecedent or consequent of a formula by cases. System S sub 3 is a fragment of the first order predicate-function calculus. In S sub 3, formulas are proved by contradiction. The quantifiers of the denial are stripped by putting the denial in miniscope form and replacing them by Skolem functors. This is reminiscent of the Herbrand technique. However S sub 3 uses a process called matching to consider only reasonable Herbrand disjuncts.

AD-602 733 Div. 15
OTS Prices: HC $3.00/MF $0.75

Naval Radiological Defense Labs., San Francisco, Calif.
A SYSTEM FOR DEVELOPMENT OF MATHEMATICAL MODELS,
by J. W. Hendricks. 23 Apr 64, 63p
Task 10 001
NRDL TR749

Unclassified report

Descriptors: (*Mathematical models, Theory), Scientific research, Decision theory, Statistical processes, Statistical distributions, Mathematical analysis, Programming (Computers), Handbooks.

This paper presents a general quantitative system for association of theory and observation. The system, in formulation and presentation, is directed toward the needs of the user investigator. It is well organized for use with automatic machines in the computing and information processing. A multivariable distribution approach to model construction is used in accounting for errors and other sources of variation. As usual, hypothesized mathematical descriptions are modified in accordance with the observational data. The requirement of a state of control is regarded as fundamental. The question of unidentifiability is given prominent consideration; and in this connection, the general necessity of calibration is established and emphasized. The principle of maximum likelihood is suggested as the most acceptable ranking criterion for the system; but modifications or decision-theoretic extensions are not precluded. In short, the ordinary restrictive conditions are not imposed in this system. The fundamental ideas are discussed within the contextual framework of the system. The general principles for applying the system are presented and discussed. The most important classes of models are dealt with mathematically in detail. (Author)

AD-602 755 Div. 15
OTS Prices: HC $5.00/MF $1.00

Louvain Univ. (Belgium).
TABLES OF BESSEL FUNCTIONS OF IMAGINARY ORDER.
Scientific rept. no. 1,
by F. Buckens. Dec 63, 180p
Grant AF EOAR63 49
AFOSR 64 1058

Unclassified report

Descriptors: (*Bessel functions, Tables), (*Tables, Bessel functions), Functions, Mathematics.

AD-602 787 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

Radiation Lab., Univ. of Michigan, Ann Arbor.
FINAL REPORT. [THEORY OF SPHEROIDAL FUNCTIONS],
by Frederick B. Sleator. Jun 64, 11p ORA 5603 1F
Grant AF AFOSR289 63
AFOSR 64 1274

Unclassified report

Descriptors: (*Special functions (Mathematical), Theory), Ellipsoids, Spheres, Geometry, Optics, Diffraction, Series, Integrals, Differential equations, Matrix algebra, Numerical analysis, Functional analysis.

The objective of this investigation, as well as an earlier one, AD-400 968, was to develop and exploit new relations between the spheroidal functions and other better known functions which might reduce the labor and complication involved in obtaining new numerical values of the spheroidal functions and thus facilitate the quantitative solutions of new spheroidal diffraction problems or the extension of existing solutions into ranges not previously

Non-linear confluence analysis, necessary for the treatment of experimental data when all variables are subject to errors, is considered from the standpoint of the maximum likelihood method. The likelihood function is a product of curvilinear integrals of the respective distribution densities of each point of the curve. For a sufficiently small curvature and a normal error distribution, these integrals are evaluated approximately, resulting in distribution functions of the normal type but with modified weights and shifted experimental points. Thus, a confluent problem is reduced to an ordinary regressional one. Weight modifications and point shifts may be found by means of successive approximations. (Author)

AD-602 580 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON ZEROES OF THE INDIVIDUAL SUMS OF A POWER SERIES.
by T. I. Krasnoshochekov. 4 May 64, 9p
FTD MT63 333, TT 64 11951
Unclassified report

Edited machine trans. of Aviatsionnyi Institut, Moscow. Trudy (USSR) 1956, v. 61, p. 37-40.

Descriptors: (*Power series, Theorems), Series, Number theory, Sequences, Functions, Inequalities, USSR.

AD-602 586 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CALCULATION OF THE EIGENVALUES OF A POLYNOMIAL MATRIX,
by V. Ya. Natanzon. 22 Apr 64, 11p
FTD MT63 306; TT 64 11957
Unclassified report

Edited machine trans. of Prikladnaya Matematika i Mekhanika (USSR) 1957, v. 21, no. 3, p. 445-448.

Descriptors: (*Matrix algebra, Polynomials), (*Polynomials, Matrix algebra), Number theory, Real numbers, Series, Power series, Continued fractions, Numerical analysis, USSR.

AD-602 588 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONCERNING A SYSTEM OF FUNCTIONS,
by G. E. Kuzmak. 16 Apr 64, 14p
FTD MT63 316; TT 64 11959
Unclassified report

Edited machine trans. of Matematicheskii Sbornik (USSR) 1954, v. 35(77) no. 3, p. 461-468.

Descriptors: (*Functional analysis, Theory), (*Functions, Series), Integrals, Inequalities, Harmonic analysis, Potential theory, Swept-back wings, Geometry, USSR.

AD-602 589 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON A CRITERION OF INSTABILITY IN THE SENSE OF LYAPUNOV OF SOLUTIONS OF A LINEAR SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS,
by R. E. Vinograd. 7 May 64, 11p
FTD MT63 326, TT 64 11960
Unclassified report

Edited machine trans. of A[kademiya] N[auk] SSSR. Doklady, 1952, v. 84, no. 2, p. 201-204.

Descriptors: (*Differential equations, Theory), Matric algebra, Functions, Integral equations, Operators (Mathematics), USSR.

AD-602 590 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A COMMENT ON A CRITICAL CASE OF THE STABILITY OF A SINGULAR POINT ON A PLANE,
by R. E. Vinograd. 22 Apr 64, 12p
FTD MT63 327; TT 64 11961
Unclassified report

Edited machine trans. of A [kademiya] N [auk] SSSR. Doklady, 1955, v. 101, no. 2, p. 209-212.

Descriptors: (*Differential geometry, Theory), Invariance, Differential equations, Equations, Motion, Stability, Trajectories, Real numbers, Projective geometry, Theorems, USSR.

AD-602 672 Div. 15, 26, 30
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
A MULTIPLE-ASSIGNMENT PROBLEM,
by David W. Walkup and M. Donald MacLaren.
Apr 64, 17p D1 82 0346, Boeing Math347
Unclassified report

Also available from the authors.

Descriptors: (*Linear programming, Operations research), Management engineering, Job analysis, Targets, Fire control systems, Optimization, Matrix algebra, Scheduling.

A generalization of Kuhn's simple assignment problem is considered: There are m men and n tasks given with each man qualified for certain of the tasks. The output from each task is given as a concave function of the number of qualified men assigned to it. Find an assignment of men to task, perhaps more than one man to a task, so as to maximize total output. An algorithm for solving this general problem is given in which transfers like those used by Kuhn on the simple problem are selected using a node-labeling procedure on a related network. The algorithm yields for every k, $1 < k < m$, an optimal assignment of the first k men only, employing a single transfer to increase k by one. Several special forms of the generalized problem are considered including a target-assignment problem which A. S. Manne has formulated as a linear program. (Author)

AD-602 692 Div. 15
OTS Prices: HC $1.00/MF $0.50

Aeronautical Computer Lab., Naval Air Development Center, Johnsville, Pa.
SOME STATISTICAL CONSIDERATIONS IN HARMONIC ANALYSIS.

rials inventory in the face of fluctuation prices in the raw material market. Statistically reliable explanatory models of the random behavior of price are constructed, and decision rules are defined as transformation of appropriately chosen state variables. Some functionals of the random outcomes of decisions are computed as functions of the undetermined parameters open in the decision rule. Trade-offs between such functionals or system characteristics are analyzed with a view to obtain a basis for the selection of 'good' values of the parameters. Theoretical results are compared against simulated systems using actual series as inputs. (Author)

covered. An adequate assessment of the forms and methods described in the discussion will depend, of course, on some fairly voluminous computations, as well as some more detailed analytical work. Preferably these two lines of advance should be closely coordinated and the overall direction should be determined in accordance with the requirements of the unsolved or only partly solved physical problems. Although the present forms should give values sufficiently accurate for practical applications, it is clear that they are more suitable for filling in gaps in existing tables as the need arises than for large-scale production of new ones. One of the principal features of the Bessel function approximation is that it exhibits the dependence of the spheroidal functions on the wavelength-eccentricity parameter c and on the eigenvalue lambda sub m n more explicitly than the usual representations. Further exploitation of this feature should be of value in a number of circumstances. (Author)

AD-602 831 Div. 15
OTS Prices: HC $2.00/MF $0.50

Naval Weapons Lab., Dahlgren, Va.
SYMBOLIC REPRESENTATION FOR SERIES.
Technical memo.
by Alfred H. Morris, Jr., and Russ Gnoffo. Dec 63, 35p
Proj. 29A
NWL K-83 63

Unclassified report

Descriptors: (*Power series, Programming (Computers)), (*Programming (Computers), Power series), (*Differential equations, Numerical analysis), Algebra, Programming languages, Control sequences, Compilers.

This paper describes and illustrates a program, which has been developed for the IBM 7090, that represents power series in a symbolic manner and then uses them for solving ordinary differential equations. (Author)

AD-602 892 Div. 15
OTS Prices: HC $9.30/MF $2.75

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
NATURAL TRIGONOMETRIC FUNCTIONS OF SINE, COSINE, AND TANGENT FROM 0 TO 360 DEGREES IN INCREMENTS OF 0.0002 RADIAN.
Oct 63, 630p ABL/X111
Contract NOrd16640

Unclassified report

Descriptors: (*Tables, Functions), (*Functions, Tables), (*Trigonometry, Function), Mathematics.

AD-602 895 Div. 15
OTS Prices: HC $2.00/MF $0.50

Space Technology Labs., Inc., Redondo Beach, Calif.
UNIFIED METHOD FOR SOLVING GENERAL BOUNDARY VALUE PROBLEMS IN LINEAR ORDINARY SYSTEMS,
by Glen J. Culler. Nov 63, 47p STL 9816 6001RU000
Contracts Nonr233 24, DA04 495ORD559

Unclassified report

Descriptors: (*Boundary value problems, Theory), Matrix algebra, Differential equations, Transformations (Mathematics), Invariance, Functions, Theorems.

AD-602 903 Div. 15, 16
OTS Prices: HC $2.00/MF $0.50

California Univ., Berkeley.
AN EVOLUTION-TYPE SEARCH METHOD FOR CONVEX SETS.
Technical rept.,
by H. J. Bremermann and M. Rogson. May 64, 32p
Contracts Nonr3656 08, Nonr222 85
Projs. NR314 103; NR049 170

Unclassified report

Descriptors: (*Convex sets, Search theory), (*Linear programming, Convex sets), Set theory, Calculus of variations, Mathematical programming, Inequalities, Real numbers, Vector analysis, Matrix algebra, Optimization, Biology, Genetics, Geometry.

AD-602 929 Div. 15, 6, 8
OTS Prices: HC $13.97/MF $4.50

Navy Electronics Lab., San Diego, Calif.
TABLES FOR THE SEQUENTIAL BINOMIAL TEST WITH DETECTION AND GENERAL APPLICATIONS.
Research rept.,
by R. A. Worley. 3 Dec 63, 1097p
Proj. SF001 02 05, Task 6072
NEL 1202

Unclassified report

Descriptors: (*Tables, Statistical tests), (*Statistical tests, Binomials), (*Binomials, Sequential analysis), Graphics, Statistical analysis, Signals, Detection, Signal-to-noise ratio, Probability, Errors, Radar equipment, Detectors, Design.

Statistics which predict the behavior of a binomial sequential test (moments and distribution of sample size and error probabilities) are tabulated for a variety of parameter combinations. Some of these statistics are plotted. Graphs and simple estimation methods are given so that a suitable sequential test may be quickly constructed. Binomial quantization of a continuous variable for a probability ratio test is considered; here the emphasis is on detection of signals in noise. The quantization levels which minimize sample size have been determined for several common underlying distributions. The behavior of functions which statistically describe test performance is discussed in relation to interpolation. (Author)

AD-602 975 Div. 15, 26
OTS Prices: HC $4.00/MF $0.75

Case Inst. of Tech., Cleveland, Ohio.
PURCHASING RAW MATERIAL IN A FLUCTUATING MARKET.
by José Trevino. Apr 64, 110p
Contract Nonr1141 11

Unclassified report

Descriptors: (*Operations research, Bargaining), (*Decision theory, Bargaining), (*Statistical processes, Operations research), (*Probability, Decision theory), Statistical analysis, Numerical analysis, Stochastic processes, Mathematical models, Inventory, Costs, Materials, Industrial procurement, Simulation.

A class of situations is considered where the usual techniques of operations research do not indicate the possibility of reducing to a common unit all the operating characteristics of a system caused by some decision and thus defining a criterion function. A special example of this class is furnished by the management of raw mate-

by N. Filimonov. 26 May 64, 8p
FTD TT64 258, TT 64 11883

Unclassified report

Unedited rough draft trans. from Meditsinskaya Gazeta (USSR) 1963 [v. 26] 21 Jun, p. 4.

Descriptors: (*Weightlessness, Space medicine), (*Astronauts, USSR), Exercise, Training, Space flight, Ear, Muscles, Central nervous system, Cardiovascular system.

A discussion of the effects of weightlessness on the human body is given. Exercise is suggested as a method of overcoming the adverse effects of weightlessness and hypodynamia.

AD-602 385 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PSYCHIATRY IN THE SOVIET UNION,
by Nikola Persic. 22 May 64, 25p
FTD TT64 259, TT 64 11895

Unclassified report

Unedited rough draft trans. of Lijecnicki Vjesnik (Yugoslavia) 1963, v. 85, no. 7, p. 747-758.

Descriptors: (*Psychiatry, USSR), Mental disorders, Hospitals, Medical personnel, Medical equipment, Medical laboratories, Neurology, Medicine, Psychology, Brain, Pathology, Therapy, Public health, Education, History, Yugoslavia.

Developments in the field of psychiatry, in psychiatric facilities, and in the education of medical personnel in th Soviet Union are discussed.

AD-602 394 Div. 16
OTS Prices: HC $1.00/MF $0.50

Kaiser Foundation Research Inst., Richmond, Calif.
STUDY OF PIGMENT SYSTEMS OF PHOTOSYNTHETIC ORGANISMS.
Final rept.,
by Mary Belle Allen. 28 Apr 64, 6p
Contract AF19 604 6636, Proj. 6694, Task 669404

Unclassified report

Descriptors: (*Organic pigments, Microorganisms), (*Photosynthesis, Abstracts), Chlorophylls, Illumination, Proteins, Absorption spectrum, Algae, Electrons, Photochemistry, Nuclear magnetic resonance.

The abstract is concerned with the pigments found in photosynthetic microorganisms, with the function of these pigments in photosynthesis, with the electron spin resonance signals induced by illumination of photosynthetic organisms, and with the isolation of a macromolecular chlorophyll complex. (Author)

AD-602 405 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE RELATION BETWEEN ARTERIAL PRESSURE CHANGES AND THE STATE OF CERTAIN REGULATING MECHANISMS IN THE EARLY PERIODS AFTER IONIZING RADIATION [AND] THE EFFECT OF WHOLE-BODY ALPHA-IRRADIATION ON LIPOLYTIC ENZYME INDUCTION BY CONNECTIVE TISSUE CELLS,
by A. N. Lanin and F. L. Leites. 28 May 64, 22p
FTD TT64 329; TT 64 11893

Unclassified report

Unedited rough draft trans. of Meditsinskaya Radiologiya (USSR) 1963, v. 8, no. 8, p. 42-48, 54-58.

Descriptors: (*Blood pressure, Radiation effects), (*Enzymes, Radiation effects), Tissues (Biology), Ionization, Blood circulation, Cardiovascular system, Autonomic nervous system, Arteries, Nerves, Radiobiology, Biochemistry, Amino acids, Metabolism, Cholesterol, Atherosclerosis, Lipids, Connective tissue, USSR.

It was concluded that: the character and degree of early changes in arterial pressure depend on the radiation dose, its rate, and also on the time which passed from the beginning of irradiation to the measuring of arterial pressure; early changes in arterial pressure have a phase character: after a relatively short period of time from the start of irradiation, the arterial pressure increases, after a longer period its decrease is proportional to the dose; and the early rise in arterial pressure is definitely connected to the reaction of the sympathetic nervous system, and the subsequent drop is tied to the predominant influence of the parasympathetic nervous system. It was also observed that for both an absorbed dose of 0.25 and 0.125 rad over the course of the test, a similar (with negligible differences) stimulating effect of wholebody alpha-irradiation onthe process of induction of lipolytic enzymes in cholesterol granuloma occurred. This documents the favorable effect of the used absorbed doses of alpha-irradiation on lipid metabolism. (Author)

AD-602 451 Div. 16, 32
OTS Prices: HC $4.00/MF $0.75

Institute of Contemporary Russian Studies, Fordham Univ., New York.
SELECTED ABSTRACTS FROM SOVIET BIOMEDICAL JOURNALS, SER. II, NO. 4,
by Robert Pollitzer. Mar 64, 106p
Contract DA19 108 405CML867A
TT 64 11920

Unclassified report

Descriptors: (*Abstracts, Microbiology), (*Microbiology, Abstracts), (*Bibliographies, Microbiology), Immunology, Medicine, Pathology, Epidemiology, Infectious diseases, Rickettsia, Pasteurella, Brucella, Bacillus anthracis, Bacteria, Viruses, Vaccines, Antibiotics, Animals, Rodents, Insecticides, Veterinary medicine, Foot and mouth disease, USSR.

The bibliography provides 238 abstracts on microbiological research as translated from Soviet biomedical journals.

AD-602 477 Div. 16, 28
OTS Prices: HC $2.00/MF $0.50

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
PLOTTING AND ANALYZING CUMULATIVE RESPONSE CURVES IN OPERANT CONDITIONING STUDIES.
Rept. no. 12,
by Robert M. Herrick. 2 Jun 64, 33p
Task MR005 13 0002 16
NADC-ML 6406

Unclassified report

Descriptors: (*Reaction (Psychology), Measurement), (*Conditioned reflex, Measurement), Time, Scale, Equations, Display systems.

16. Medical Sciences

AD-602 325 Div. 16, 28, 30
OTS Prices: HC $3.00/MF $0.75

Boeing Scientific Research Labs., Seattle, Wash.
PATTERN RECOGNITION BY THE METHOD OF ISOCLINES: I. A MATHEMATICAL MODEL FOR THE VISUAL INTEGRATIVE PROCESS.
by W. C. Hoffman. May 64, 64p D1 82 0351; Boeing Math351

Unclassified report

Also available from the author.

Descriptors: (*Pattern recognition, Mathematical analysis), (*Vision, Mathematical models), (*Mathematical models, Vision), Graphics, Theory, Models (Simulations), Differential equations, After-images, Optical images, Sensory mechanisms, Animals, Eye, Nervous system, Physiology, Bionics.

A theoretical model for the visual integrative process is advanced that is based upon microelectrode studies of the animal visual cortex by Hubel and Wiesel, Jung, and others. In this theoretical model the cortical columns of direction-sensing elements found by Hubel and Weisel are interpreted as sets of isoclines making up the visual field. The form of a visual image corresponds to a family of contours ('orbits' or 'paths', in the terminology of differential equations) that pass through those isoclines stimulated by the corresponding retinal regions. A contour of an image is thus approximated in the visual cortex as an isoclinic polygonal arc. Hubel and Wiesel's microelectrode studies are thus strongly suggestive of a differential equation interpretation of the visual integrative process. The invariance of the visual integrative process under rigid motions (translation and rotation) and perspective that is required by the psychological phenomenon of Gestalt enables us to specify the particular form of the differential equations involved. (Author)

AD-602 332 Div. 16, 17.
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE ROLE OF BACTERIA IN ELECTROCHEMICAL CORROSION OF STEEL IN SEA WATER,
by L. A. Rozenberg. 18 Jun 64, 16p
FTD TT64 393; TT 64 11858

Unclassified report

Unedited rough draft trans. of Mikrobiologiya (USSR) 1963, v. 32, no. 4, p. 689-694.

Descriptors: (*Corrosion, Steels), (*Bacteria, Corrosion), (*Steels, Corrosion), Stainless steel, Surface properties, Corrosion inhibition, Degradation, Spirillaceae, Pseudomonas, Biological contamination, USSR, Sea water, Sulfates, Fungus deterioration.

Bacteria play a role of biological depolarizers and activators in the process of electrochemical corrosion of steel in sea water. The role of bacteria is very important in the initial period when they activate the metal surface and accelerate the formation of microgalvanic elements. Later on, corrosion of the metal becomes apparent due to increased use of molecular hydrogen and depolarization of the cathode, and due to the work of the galvanic pairs which is maintained by the anode process and by the bacteriogenic hydrogen sulfide contacting the metal. Only intensely reproducing bacteria with a well-expressed production of hydrogen sulfide or ammonia enhance the biological corrosion of carbon steel. Most of the cultures studied cause biological corrosion of carbon steel leading to a significant loss of metal. (Author)

AD-602 335 Div. 16, 1
OTS Prices: HC $5.00/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SPEED, ACCELERATION, WEIGHTLESSNESS: [SOME PROBLEMS IN PHYSICS AND PHYSIOLOGY IN CONNECTION WITH ATMOSPHERIC AND SPACE FLIGHTS],
by P. K. Isakov and R. S. Stasevich. 10 Jun 64, 154p
FTD MT63 103, TT 64 11861

Unclassified report

Edited machine trans. of mono. Skorosti, Uskoreniya, Nevesomost' : Nekotorye Voprosy Fiziki i Fiziologii Primenitel'no k Poletam v Atmosfere i Kosmicheskom Prostranstve, Moscow, 1962, 150p.

Descriptors: (*Space flight, Physiology), Velocity, Acceleration, Weightlessness, Vestibular apparatus, Physical fitness, Rockets, Fuels, Spacecraft, Astronauts, Stimulation, Reflexes, Space medicine, Blood circulation, Shock (Pathology), USSR.

Speed, acceleration and weightlessness are considered in the light of new data. A special chapter is devoted to the question of weightlessness, in which the physical conditions arising from this phenomenon and its influence on the human organism and animals under space-flight conditions are reported. (Author)

AD-602 364 Div. 16, 7
OTS Prices: HC $2.00/MF $0.50

Magna Corp., Anaheim, Calif.
BIOCHEMICAL FUEL CELLS.
Quarterly progress rept. no. 7, 1 Jan-31 Mar 64,
by J. J. Cavallo. 31 Mar 64, 50p
Contract DA36 039sc90866, Task 1G6 22001A053 04

Unclassified report

A Conference was held at the U. S. Army Electronics Labs., on Mar 4, 1964, to discuss the progress and direction of the work.

Descriptors: (*Biochemistry, Fuel cells), (*Fuel cells Biochemistry), Electrochemistry, Voltage, Electric currents, Glucose, Escherichia coli, Pseudomonas, Formic acids, Electrodes, pH, Methylene blue, Catalysts, Oxidation, Plants (Botany).

Investigation of the formic acid bioanode using E. coli as the biological catalyst was continued. The effect of varying the pH and ionic strength of the supporting anolyte, the number of bacteria, and the addition of methylene blue are reported. Attempts to inhibit the formation of the hydrogenlyase system, which degrades the formic acid, in E. coli were largely unsuccessful. However, a new organism, Pseudomonas formicans, was substituted. This organism carries out a mixed acid fermentation similar to that of E. coli, but is not capable of producing a hydrogenlyase system. Preliminary bioelectrochemical studies with this organism in an integrated cell, have produced current densities of 5 mA/sq cm at a polarization of only 0.26 volt. (Author)

AD-602 375 Div. 16, 23
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IN A HEALTHY BODY, A HEALTHY SPIRIT,

Physiology, Reflexes, Laboratory animals, Pulse rate, Respiration, Motor reactions, Measurement, Dogs.

The action of slow acceleration on experimental dogs under the conditions of cumulation of stimulation resulted in a number of vegetative disorders, similar to the symptoms of sea-sickness. The degree of expression of these reactions was directly dependent on the magnitude of the acceleration at work. Vegetative reactions, observed during the cumulation of stimulation, were manifested in the form of quickening of respiration and pulse fluctuations, a decrease in the amplitude of fluctuations of the curves of pulse and respiration, and increase in salivation, involuntary urination and defecation, general sluggishness, and loss of appetite. The most noticeable changes in the physiological reactions of the organism took place during the action of acceleration frequently changing in magnitude and direction and especially during the action of deceleration. As a result of excluding the function of the vestibular apparatus the normal relations were disturbed between the different analyzers which during the action of acceleration led to an intensification of motor reaction and a disturbance of cortical regulation of the reflex activity of the compensator mechanism. (Author)

AD-602 637 Div. 16, 18, 1
OTS Prices: HC $1.00/MF $0.50

Army Natick Labs., Mass.
QUALITATIVE EVALUATION OF THE AIRDROP IMPACT CAPABILITY OF THE STERILIZER, AUTOCLAVE FOR SPECIAL FORCES.
by H. E. Antkowiak. Sep 63, 19p
ANL AE016

Unclassified report

Descriptors: (*Medical equipment, Air drop operations), (*Air drop operations, Medical equipment), Cargo parachutes, Deformation, Landing impact, Velocity, Stresses, Damage, Armed forces supplies, Parachute descents, Honeycomb cores, Sandwich construction, Paper, Packing materials.

The airdrop impact capability of the fuel-heated pressure autoclave dressing sterilizer was evaluated. Six and static and one airdrop were conducted. Results indicate there was no evidence of structural deformation or functional defects. It was concluded that the sterilizer design is adequate for airdrop on a parachutist and by standard airdrop techniques, using paper honeycomb as an energy dissipater. (Author)

AD-602 638 Div. 16
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
HALLUCINOGENIC DRUGS: A PERSPECTIVE WITH SPECIAL REFERENCE TO PEYOTE AND CANNABIS,
by William H. McGlothlin. Jul 64, 84p P-2937

Unclassified report

Descriptors: (*Hallucinogens, Anhalonium alkaloids), (*Anhalonium alkaloids, Addiction), (*Addiction, Anhalonium alkaloids), (*Cannabis, Tolerances (Physiology), Drugs, Psychophysiology, Religion, Culture, Lysergic acids, Psychotropic agents, Bibliographies.

The extensive literature on peyote and Cannabis sativa (marihuana), with particular emphasis on reducing the uncertainty about the benefits or perils inherent in the use of LSD and other recent additions to the hallucinogen family is reviewed: (1) Introduction, (2) Addiction and habituation, (3) Peyote, (4) Cannabis, and (5) The LSD controversy.

AD-602 642 Div. 16
OTS Prices: HC $1.00/MF $0.50

Valley Forge General Hospital, Phoenixville, Pa.
RETURN OF MILITARY MEMBERS TO DUTY TO CONTINUE THERAPY, WHILE ON A DUTY STATUS, FOR PERIODS UP TO 12 MONTHS AND ANNUAL FOLLOW-UP FOR A MINIMUM OF FIVE YEARS AFTER COMPLETION OF CHEMOTHERAPY.
Annual progress rept. for 1 Jul 63-30 Jun 64,
by Stephen J. Berte' and Steven E. Levy. 30 Jun 64, 5p
Proj. 6X97 87 001

Unclassified report

Descriptors: (*Military personnel, Chemotherapy), (*Respiratory diseases, Military personnel), Diseases, Mycrobacterium tuberculosis, Medical examination, X-rays, Drugs, Physical fitness, Military medicine.

During the period from February 1957 through 30 June 1964, 825 patients were returned to duty on chemotherapy. Follow-up examination during chemotherapy consisted of X-rays, tuberculosis cultures, and/or physical examinations every three months and X-rays and/or physical examinations annually following chemotherapy for a minimum of five years. Of the 825 patients, there were twelve proven relapses, a percentage of 1.4%; presently, the follow-up rate is 72.8%. This study clearly shows that it is feasible to return patients with tuberculosis to active duty on chemotherapy for periods up to twelve months. (Author)

AD-602 649 Div. 16, 30
OTS Prices: HC $3.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON THE CONSTRUCTION OF A SIMULATION OF THE INITIAL PSYCHIATRIC INTERVIEW,
by Richard Bellman, M. B. Friend, and Leonard Kurland. Jul 64, 57p RM-4044NIH
Grant PHS GMO9608 03

Unclassified report

Descriptors: (*Psychiatry, Programming (Computers)), (*Dynamic programming, Psychiatry), Simulation, Digital computers, Education, Attitudes, Verbal behavior, Decision making, Reaction (Psychology), Communication theory, Diagnosis, Medical personnel, Medical examination.

The construction of a simulation of an initial psychiatric interview, which can be regarded as an example of an adaptive, multistage decision process is described in order to augment current methods of teaching psychiatric interviewing and to provide an additional tool for exploring basic problems of two-person communication.

AD-602 702 Div. 16
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley.
SYNAPTIC TRANSMISSION IN SYMPATHETIC GANGLIA.
Final rept. for 1 Jul 63-30 Jun 64,
by Benjamin Libet. 15 Jul 64, 4p
Contract DA18 108AMC161A

Unclassified report

Descriptors: (*Neuromuscular transmission, Nerve cells), (*Ganglia, Autonomic nervous system), (*Atropine, Neuromuscular transmission), Drugs, Alkaloids, Brain, Autonomic agents, Sympathomimetic agents, Parasympatholytic agents, Psychophysiology.

The synaptic mechanisms in sympathetic ganglia and the

AD-602 496 Div. 16
OTS Prices: HC $2.00/MF $0.50

Malecki Labs., Inc., Chicago, Ill.
PRESERVATION OF BIOLOGICAL MATERIALS BY FREEZE-DRYING.
Final rept. for 1 Jul 62-31 Mar 64,
by George J. Malecki. 31 Mar 64, 40p
Contract DA49 193MD2297

Unclassified report

Descriptors: (*Freeze drying, Biochemistry), (*Preservation, Freeze drying), Dehydration, Dessicants, Gelatins, Nitrogen, Nitrogen compounds, Ethyl ethers, Ethanols, Meat, Escherichia coli, Viability, Histological techniques, Blood, Lipids.

The feasibility of freeze-dehydrating biological materials by extracting frozen moisture with dry cryogenic liquids in the presence of dessicants was investigated. Freeze-dehydration of hydrated gelatin capsules in liquid nitrogen and liquid nitrous oxide proceeded too slowly to be evaluated. Dehydration was feasible in ethyl ether and ethyl alcohol at dry ice-alcohol temperature (-78.5C). The presence of a dessicant in the dehydration system was found to be essential for complete drying. A sequential vacuum freeze drying-nitrous oxide critical point dehydration technique was used to obtain porous dehydrated meat tissue. Dehydration of partially freeze dried meat tissue (10% residual moisture) was also carried to completion (<1% moisture) in a dry liquid at -78.5Cin the presence of molecular sieves. Preliminary data indicated that microorganisms can be similarly dehydrated with retention of viability. (Author)

AD-602 526 Div. 16
OTS Prices: HC $2.00/MF $0.50

Miami Univ., Coral Gables, Fla. School of Medicine.
HUMAN ELECTRORETINOGRAPHY AS A GAUGE OF VISUAL PERFORMANCE.
Annual progress rept. no. 1, 1 Sep 62-1 Jun 63,
by Thorne Shipley. 21 Jun 63, 26p
Contract DA49 193MD2344

Unclassified report

Descriptors: (*Retina, Electric currents), (*Visual acuity, Measurement), Infants, Humans, Adults, Medical equipment, Medical examination, Eye, Cornea, Visual acuity, Visual perception, Adaptation (Physiology), Photosensitivity, Blindness, Light, Skin, Eye pigments.

Human electroretinograms (ERG) of 191 subjects were taken in the ERG laboratories of the Bascom Palmer Eye Institute, with reference to: (1) doubling of a and b components, (2) correlation with dark - adaptation, (3) general inhibitory effects, (4) general systemic ERG inhibition and enhancement, (5) binocular interaction effects, and (6) ERG in relation to maturation. Supportive animal studies are included in this research. The doubling of the b - wave may be related to photophobia and skin pigmentation. The ERG can be used as an objective index of dark -adaptation. The absence of the b - wave in the night blind is interpreted as an example of possible specific inhibition rather than of specific loss of structure. Possible binocular interaction effects are noted. The role of the ERG in general systemic retinal functioning is noted. The ERG in neonates presents clear evidence of the existence of dark - adaptation at birth. The chemical maintenance of the ERG in the isolated animal retina is reported.

AD-602 545 Div. 16, 5
OTS Prices: HC $1.00/MF $0.50

Naval Medical Research Lab., New London, Conn.
SPEECH INTELLIGIBILITY DURING PROLONGED EXPOSURE TO HELIUM-OXYGEN.
Memorandum rept.
by J. Donald Harris. 13 May 63, 11p
Task MR005 14 1001 4 02
NMRL MR63 8

Unclassified report

Descriptors: (*Speech, Intelligibility), (*Helium, Adaptation (Physiology)), (*Speech recognition, Underwater communication systems), (*Adaptation (Physiology), Speech), Sound, Respiration, Underwater, Oxygen, Physiology, Noise, Pressure, Audiometry, Statistical tests, Naval personnel.

Changes in the intelligibility of speech during six days of breathing a mixture of helium and oxygen were investigated. Speech was sampled before breathing the mixture, and on the second, fourth and sixth days of exposure in a chamber containing 21% oxygen and 79% helium. There was a deterioration in intelligibility on the second day which was not observable thereafter. A return to more natural speech also occurred by the fourth and sixth days. It is suggested that a talker attains a more normal quality and intelligibility to his speech after becoming accustomed to several days exposure to the helium-oxygen mixture described. (Author)

AD-602 585 Div. 16, 30
OTS Prices: HC $3.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COORDINATION OF VOLUNTARY MOVEMENTS OF A HUMAN FROM THE STANDPOINT OF GENERAL REGULARITIES OF CONTROL AND CONTROL SYSTEMS,
by L. V. Shakhaidze. 6 Feb 64, 56p
FTD MT63 265; TT 64 11956

Unclassified report

Edited machine trans. of Problemy Kibernetiki (USSR) 1962, v. 8, p. 309-336.

Descriptors: (*Musculoskeletal system, Motion), (*Central nervous system, Control systems), (*Neuromuscular transmission, Motion), Brain, Nerve cells, Stimulation, Adaptation (Physiology), Motor reactions, Sensory mechanisms, Proprioception, Simulators, Models (Simulations), Humans, Cybernetics, Ganglia, Muscles, Joints (Physiology), Programming (Computers), Skeleton, Feedback, USSR.

Contents: The basic problems confronting the central nervous system in the control of voluntary movements, General diagram of control of voluntary movements in a human, Certain data on activity of master and programming mechanisms, Concerning the question of activity of the collating mechanism.

AD-602 599 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
VESTIBULAR REACTIVITY DURING THE CUMULATIVE ACTION OF SLOW CENTRIPETAL ACCELERATIONS,
by A. E. Kurashvili. 24 Jan 64, 17p
FTD MT63 179, TT 64 11970

Unclassified report

Edited machine trans. of Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei (USSR) 1962 v. 22 no. 1, p. 49-55.

Descriptors: (*Vestibular apparatus, Acceleration), (*Acceleration, Vestibular apparatus), Deceleration,

Grant AF AFOSR204 63
AFOSR 64 1276

Unclassified report

Descriptors: (*Brain, Embryos), (*Serotonin, Brain), (*Behavior, Serotonin), Rats, Biochemistry, Growth.

These studies were undertaken to provide a basis for future experiments in which the catecholamine and/or serotonin of the brain would be altered at various stages of embryonic and neonatal development and the influence of such changes on subsequent development of certain types of behavior determined. Infant rats were killed at different times after birth. The entire brain, including the medulla, was quickly removed and immediately homogenized in two volumes of cold 0.01 N hydrochloric acid. Total catecholamines were determined in aliquots of the homogenate by a slight modification of the procedure of Shore and Olin. There appear to be two periods in the young, developing rat at which rather abrupt increases in total catecholamine concentration occur. The first of these is at some time between one and one half and four days after birth and the second when the animal is twenty-four to twenty-eight days of age. At the latter time concentrations of brain serotonin are more than twice those found in the newly born animal.

AD-602 786 Div. 16
OTS Prices: HC $2.00/MF $0.50

Sao Paulo Univ. (Brazil).
ROLE OF VARIOUS BRAIN STRUCTURES ON PHYSIOLOGICAL FUNCTIONS.
Final technical rept. for 1 May 63-1 May 64,
by Miguel R. Covian. 12 Jun 64, 27p
Grant AF AFOSR311 63, continuation of Grant AF AFOSR62 335
AFOSR 64 1272

Unclassified report

Descriptors: (*Nervous system, Physiology), (*Brain, Physiology), Water, Metabolism, Adrenal glands, Thalamus, Electrolytes (Physiology), Blood pressure, Arteries, Obstruction (Physiology), Drugs, Respiration, Hypertension, Hearing, Vision, Cerebral cortex, Sex hormones, Birth, Reaction (Psychology), Conditioned reflex, Diabetes, Pancreas, Insulin, Sensory mechanisms, Motor reactions, Tolerance (Physiology), Brazil.

Summaries of 15 works completed or being studied are presented.

AD-602 788 Div. 16
OTS Prices: HC $1.00/MF $0.50

Pennsylvania State Univ., University Park.
PHOTOMETABOLISM.
Research rept. for 1 Jan 63-30 Jun 64,
by E. S. Lindstrom. 1964, 3p
Grant AF AFOSR62 283A
AFOSR 64 1269

Unclassified report

Descriptors: (*Photosynthesis, Bacteria), (*Bacteria, Photosynthesis), Abstracting, Metabolism, Oxidation-reduction reactions, Organic pigments, Carotenoids.

AD-602 790 Div. 16
OTS Prices: HC $1.00/MF $0.50

Maudsley Hospital, London (England).
CHEMICAL FACTORS IN CEREBRAL EXCITATION.
Final technical rept.
by H. McIlwain. 8 May 64, 14p
Grant AF EOAR63 1
AFOSR 64 1275

Unclassified report

Descriptors: (*Cerebral cortex, Nerve impulses), (*Nerve impulses, Cerebral cortex), (*Membranes (Biology), Electrical properties), Excitation, Stimulation, Electrodes, Electrolytes (Physiology), Cells (Biology), Tissues (Biology), Sodium compounds, Potassium compounds, Chlorides, Body fluids, Neuromusculation transmission, Great Britain.

Membrane potentials recorded intracellularly from slices of cerebral cortex gave a mean value of 59 ± 10 mV (S.D.). Potentials were more stable in media containing 2.6 mM calcium than in media with 0.75 mM calcium. Small amounts of KCl were applied to the tissue surface, and calculated to give by diffusion concentrations of K up to 100 mM near the cells under observation. The KCl diminished the potentials, which subsequently recovered. Similar results were obtained by additions of sodium glutamate. Analysis of the tissue for Na, K, Cl and inulin showed that considerable gradients existed for these ions between tissue and incubation fluid; the gradients were compared with the observed membrane potentials. (Author)

AD-602 818 Div. 16
OTS Prices: HC $5.00/MF $1.00

Pfizer (Chas.) and Co., Inc., Brooklyn, N. Y.
PREPARATION AND EVALUATION OF STAPHYLOCOCCAL ENTEROTOXOIDS.
Annual progress rept. for 1 May 63-1 Aug 64,
by B. A. Sobin. 1 Aug 64, 187p
Contract DA49 193MD2428

Unclassified report

Descriptors: (*Staphylococcus, Toxins and antitoxins), (*Toxins and antitoxins, Preparation), Bacterial extracts, Laboratory animals, Toxicity, Immunity, Antigen-antibody reactions, Parenteral infusions, Injection (Medicine), Tolerances (Physiology).

Thirty Staphylococcal enterotoxiods were prepared and evaluated in rhesus monkeys in a range finding study designed to compare toxicities, antibody response, and protection against intraveneous challenge with untreated Staphylococcal enterotoxin. The immunization schedule consisted of three subcutaneous injections of toxoid with adjuvant spaced at intervals of five weeks. Some toxicity (emesis, diarrhea) was observed with most of the toxid preparations following the first subcutaneous immunization injection. No toxic reactions followed the second and third immunization injections. Antibody titers, as measured by hemagglutination and gel-diffusion, were generally low after the first immunization injections. Many of the antibody titers rose sharply after the second and third injections. A number of the Staphylococcal enterotoxoid preparations provided excellent protection in monkeys against intravenous challenge with untreated Staphylococcal enterotoxin three weeks after the third and final immunization injections. (Author)

AD-602 822 Div. 16, 28
OTS Prices: HC $3.00/MF $0.50

Institute for Behavioral Research, Silver Spring, Md.
DRUG EFFECTS IN COMPLEX BEHAVIORAL REPERTOIRES IN MONKEYS, BABOONS, AND MAN.
Semi-annual rept. for 1 Oct 63-31 Mar 64,
by P. K. Levison, J. D. Findley, and C. B. Ferster.

ways in which low doses of atropine may act in the body were investigated. The results obtained support the contention that there is an adrenergic (inhibitory) synaptic mechanism operating in ganglia, in addition to the well-known cholinergic one. The activation of this adrenergic mechanism by preganglionic impulses was found to be sensitive to blockade by atropine. Atropine can affect brain function, and has been shown in recent years to block specifically cholinergic effects at certain sites in the brain. Analyses of the effects of cholinergic agents and atropine on brain function should take into account the possibility that these effects are transpiring at postsynaptic sites which generate slow synaptic responses, of the types seen in sympathetic ganglia. (Author)

AD-602 756 Div. 16, 4
OTS Prices: HC $1.00/MF $0.50

Florida State Univ., Tallahassee.
RESEARCH IN PHOTOBIOLOGY AND PHOTOCHEMISTRY.
Final rept. for 1 Apr 63-30 Apr 64,
by Hans Gaffron. 23 Jun 64, 6p
Grant AF AFOSR62 190
AFOSR 64 1192

Unclassified report

Descriptors: (*Photochemistry, Metabolism), (*Photosynthesis, Chemical reactions), Ascorbic acid, Oxidation, Anthoxanthin pigments, Plants (Botany), Herbicides, Ureides, Algae, Light, Absorption, Acetates, Hydrogen, Oxygen.

Work in the following areas is briefly summarized: stepwise photoxidation of ascorbate by illuminated flavin in homogenous solution; reversibility of herbicide action; use of isolated chloroplasts as light-absorbing constituents in artificial photoxidations; light-induced acetate assimilation in algae; simultaneous release of H2 and O2 from adapted algae in light when CO2 is absent.

AD-602 775 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval School of Aviation Medicine, Pensacola, Fla.
VISUAL CONTROL OF HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN.
Rept. no. 95,
by Fred E. Guedry, Jr. 5 May 64, 23p
Proj. MR005.13-6001, NASA Order R 93

Unclassified report

Descriptors: (*Vestibular apparatus, Stimulation), (*Vision, Adaptation (Physiology)), Motion sickness, Control, Rotation, Humans.

Twenty men completed an experiment in the Pensacola Slow Rotation Room while it rotated for several hours at a rate of 45 deg/sec. Subjects were immobile (relative to the room) except for habituation series which consisted of head movements restricted to one plane and to a particular quadrant of that plane. Visual problems were presented with each head movement to one group of subject; another group made all head movements of the habituation series in darkness. Tests conducted in darkness before and after the habituation series revealed pronounced reductions in nystagmus and subjective effects in the practiced quadrant only in the 'visual-task' group. The other group showed no reduction of nystagmus in either the practiced or unpracticed quadrant. This experiment considered together with another experiment just completed indicates that vision can be an important factor in habituation of human subjects to vestibular stimulation. (Author)

AD-602 779 Div. 16
OTS Prices: HC $1.00/MF $0.50

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
A DISCUSSION OF MEDICAL MONITORING IN RELATION TO SAFETY IN CENTRIFUGE OPERATIONS.
Rept. no. 10,
by Stuart Ragland, Jr. 17 Jun 64, 13p
Task MR005 13 1004 1
NADC-ML 6410

Unclassified report

Descriptors: (*Monitors, Medical equipment), (*Acceleration tolerance, Monitors), Voice communication systems, Television communication systems, Electrocardiography, Diagnosis, Safety, Simulation, Centrifuges.

The use of humans as subjects during centrifuge experiments and simulations requires that constant medical monitoring be performed by a physician who is completely familiar with the requirements and procedures of the experiment. The tools and techniques of the medical monitor are evaluated in relation to their effectiveness as aids in the performance of this job. Specifically, the importance of a continuous voice communication loop between the subject and monitor is stressed so that the monitor can make continuing judgments regarding the subject's condition based on the appropriateness of answers, occurrence of coughing, etc. Great emphasis is placed on the importance of closed circuit television as an aid in monitoring since the appearance of the subject's face, especially his eyes can be checked for changes during the runs. The role of the electrocardiogram in monitoring is discussed as are some of the problems developed during acceleration runs. Some of the factors involved in proper selection of subjects for centrifuge experimentation also are presented. (Author)

AD-602 784 Div. 16
OTS Prices: HC $1.00/MF $0.50

Henri Rousselle Hospital, Paris (France).
RELATION OF THE VISCERAL AFFERENTS TO THE ACTIVITY OF THE BRAIN STEM RETICULAR FORMATION
Final technical rept. for 10 Feb 59-30 Jun 63,
by P. C. Dell. 30 Jun 63, 24p
Contract AF61 052 229
AFOSR 64 1270

Unclassified report

Descriptors: (*Brain, Neuromuscular transmission), (*Neuromuscular transmission, Brain), Control systems, Galvanic skin response, Eye, Adaptation (Physiology), Sensory mechanisms, Motor reactions, Respiration, Stimulation, Cerebral cortex, Autonomic nervous system, Nerves, Reflexes, Ear, Muscles, Thalamus, Hypoxia, Vestibular apparatus, Optic nerve, Auditory nerve, Central nervous system.

Summaries of research on Bulbar control of mesencephalic reticular activation and the ensuing changes in galvic skin reflex, pupillary reactions and cortical arousal, (2) Reticular control of sensory system, (3) Vigilance and motor integration, and (4) Reticular activating system and the control of Respiration are presented.

AD-602 785 Div. 16
OTS Prices: HC $1.00/MF $0.50

Minnesota Univ., Minneapolis.
ALTERATIONS OF BRAIN BIOCHEMISTRY AND DEVELOPMENT OF BEHAVIOR,
by F. E. Shideman. 1964, 5p

Pyrogens), Immunity, Chromatographic analysis, Bacterial extracts, Toxins and antitoxins, Tissues (Biology), Rodents, Rabbits, Humans, Viruses.

A study of leukocytic pyrogens is summarized. The production, isolation, and characterization of crude pyrogen along with chromatographic, electrophoretic, and electron microscopic analysis is described. Immunologic studies conducted on laboratory animals treated with pyrogenic material, and antibody reactions in tissue cultures are also discussed.

AD-602 914 Div. 16
OTS Prices: HC $2.00/MF $0.50

Munich Univ. (West Germany).
POTENTIAL FACTORS IN THE EPIDERMAL HORNY STRATUM FAVORING OR REPELLING INSECT BITES. DERMATOPHYSIOLOGICAL INVESTIGATIONS CONCERNING THE ATTRACTION OF MOSQUITOES TO HUMAN BEINGS.
Final technical rept. for 1 Jan-31 Dec 63,
by Klaus Bosse. 31 Dec 63, 27p
Contract DA91 591EUC2695

Unclassified report

Descriptors: (*Perspiration, Chemical analysis), (*Steroids, Skin), (*Culicidae, Bites and stings), (*Amino acids, Skin), Estrogens, Reproductive system, Humans, West Germany, Biochemistry.

AD-602 921 Div. 16
OTS Prices: HC $2.00/MF $0.50

Institute of Contemporary Russian Studies, Fordham Univ., New York.
OBSERVATIONS ON THE PRESENT STATE OF PLAGUE AND PLAGUE CONTROL IN THE SOVIET UNION (ACCORDING TO DATA AVAILABLE TO 31 OCT 60).
Jun 64, 32p
Contract DA18 108 405CML867 A

Unclassified report

Descriptors: (*Indexes, Epidemiology), (*Epidemiology, Bibliographies), (*Communicable diseases, Control), (*Pasteurella, Bibliographies), Reports, Pathology, Bacteria, Chemotherapeutic agents, Antigen-antibody reactions, Immunity, Insecticides, Pest control, Subject indexing, Rodents, Microiology, Vaccines, Medicine, Diseases, USSR.

Articles concerning observations on plague and plague control in the Soviet Union are indexed. References to previous reports are listed according to subject, author, place, and institution.

AD-602 934 Div. 16
OTS Prices: HC $1.00/MF $0.50

Gorgas Hospital, Health Bureau, Balboa Heights (Canal Zone).
PROFOUND HYPOTHERMIA BY PERITONEAL LAVAGE; CARDIOVASCULAR SUPPORT BY MECHANICAL 'PULSATOR' MASSAGE.
Annual progress rept. for 16 Jul 63-30 Jun 64,
by Casper Rea. 30 Jun 64, 4p
Proj. 5015

Unclassified report

Descriptors: (*Hypothermia, Heart), (*Heart, Pathology), (*Mechanical organs, Hypothermia), Injection (Medicine), Peritoneum, Blood pressure, Blood circulation, Blood vessels, Cardiovascular system, Body temperature, Electronic equipment, Panama.

AD-602 935 Div. 16
OTS Prices: HC $1.00/MF $0.50

Gorgas Hospital, Health Bureau, Balboa Heights (Canal Zone).
INVESTIGATION OF METHODS IN TREATING MAXILLO-FACIAL FRACTURES.
Annual progress rept. for 24 Jan-30 Jun 64,
by Ervin E. Hunsuck. 30 Jun 64, 4p

Unclassified report

Descriptors: (*Fractures (Bone), Head), (*Head, Fractures (Bone)), Bone, Joints (Physiology), Medical supplies, Healing, Musculoskeletal system, Medicine, Plastic surgery, Face, Panama.

Objective of this investigation is to supplement accepted methods of reduction of maxillo-facial fractures by introducing newer means of fixation. Dogs are to be used to ascertain the feasibility of intraoral open reductions using pre-formed metallic means of fixation and stainless steel wire. When practicable, intraoral open reductions will be used on humal patients. There will be histologic study of the physiologic response of osseous structures to the immobilization appliances. Three patients have been successfully treated by newer and revised methods of fixation. The methods utilized in the three cases that were successful could be performed in a mass casualty situation without the benefit of an operating room and required ancillary personnel.

AD-602 953 Div. 16
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
BIOCHEMISTRY OF TOXIC PROTEINS. PHASE TWO. ISOLATION AND CHARACTERIZATION OF COBRA NEUROTOXINS.
Final rept. for 1 Nov 62-30 Apr 64,
by George B. Sumyk and James Q. Kissane. 1 Jul 64, 79p
Contract DA18 108 405CML928

Unclassified report

Descriptors: (*Venoms, Chemical analysis), (*Toxins and antitoxins, Nervous system), Reptiles, Proteins, Chromatographic analysis, Ion exchange, Carboxymethylcellulose, Biochemistry.

In the course of the investigation an efficient and reproducible procedure for isolation of neurotoxic principles from cobra venom was developed. Dialysis of crude venom and subsequent pH gradient chromatography on carboxymethylcellulose ion exchanger resulted in the isolation of two different toxic principles. Both neurotoxins possess comparable isoelectric points and lethal activities. The LD(50) of dry preparations range between 90 and 120 micro-g of protein per kilogram of mouse. (Author)

AD-602 962 Div. 16
OTS Prices: HC $1.00/MF $0.50

Ingersoll-Rand Co., Timonium, Md.
ENDOCRINOLOGIC EFFECTS OF ALTERED CONSCIOUSNESS.
Final comprehensive rept.
1964, 5p
Contract DA19 108AMC187A

Unclassified report

Descriptors: (*Brain, Wounds and injuries), (*Endocrine glands, Shock (Pathology)), Secretion, Adrenocorticotropic hormones, Central nervous system, Nervous system diseases, Hormones.

3 Jun 64, 53p
Contract DA18 108AMC26A

Unclassified report

Descriptors: (*Chlorpromazine, Behavior), (*Reaction (Psychology), Chlorpromazine), Psychology, Pharmacology, Performance (Human), Learning, Conditioned reflex, Memory, Performance tests, Laboratory animals, Tranquilizers, Stimulation, Drugs, Dosage, Psychiatry, Medical examination, Humans, Monkeys.

Complex behavioral performances in monkeys, baboons, and man are described; important variables in determining the acquisition and maintenance of these behaviors are discussed. The behaviors include two different 'counting' routines with the animals, and a matching-to-sample problem-solving task with humans. The effects of a tranquilizing drug, chlorpromazine, upon counting and matching-to-sample are presented. Graphs and photographs are included. (Author)

AD-602 852 Div. 16
OTS Prices: HC $1.00/MF $0.50

Boston Univ., Mass. School of Medicine.
ESTER SYNTHESIS FROM INOSINE, DEOXYINOSINE, AND RIBOSE-5-PHOSPHATE IN HUMAN ERYTHROCYTE GHOSTS.
Final technical rept. for 1 May 63-30 May 64,
by Fabian J. Lionetti. 27 Jul 64, 13p
Contract DA49 007MD542

Unclassified report

Descriptors: (*Erythrocites, Metabolism), (*Esters, Biosynthesis), Pentoses, Hexoses, Ribose, Fructose, Enzymes, Phosphorous compounds, Lactic acid, Nucleosides, Glycolysis, Phosphorylation, Carbohydrates, Phosphorus compounds, Blood cells, Viability, Biochemistry.

Pathways for the conversion of pentoses to hexoses were studied in ghosts with inosine, deoxyinosine, and ribose-5-phosphate as substrates. Inosine and ribose-5-phosphate were qualitatively similar in the synthesis of ketopentose-phosphates, triosephosphates, and hexosephosphates. Quantitative differences in turnover rates were found to be dependent on the substrate concentrations of esters incubated. With inosine a hexose to triose ratio of 2:1 was observed at equilibration, while a ratio of 1:1 was found with ribose-5-phosphate. Hexose synthesis, apparently inhibited at high ribose-5-phosphate concentrations, is explained as a displacement of donor fructose-6-phosphate by acceptor ribose-5-phosphate in the bimolecular reaction with the enzyme transaldolase. This acted to stimulate the production of trioses. Phosphoglycerate and lactic acid synthesis also exhibited different kinetic characteristics for both inosine and ribose-5-P. Both phosphoglycerates and lactate increased kinetically with inosine and decreased with ribose-5-P. The data suggest that a pathway from ribose-5-phosphate to phosphoglycerates exists in the erythrocyte. (Author)

AD-602 856 Div. 16, 29
OTS Prices: HC $1.00/MF $0.50

Army Chemical Research and Development Labs., Edgewood Arsenal, Md.
REVIEW OF THE WORK ON RESUSCITATION,
by Rudolph P. Johnson. Jun 64, 16p
CRDL TM2 5

Unclassified report

Descriptors: (*Breathing apparatus, Artificial respiration), (*Artificial respiration, Breathing apparatus), Medical equipment, Breathing masks, Pressure breathing, Chemical warfare injuries.

AD-602 879 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RECONSTRUCTION OF MOLECULES,
by I. Shabanova. 14 Jul 64, 4p
FTD TT64 581, TT 64 71133

Unclassified report

Unedited rough draft trans. from Vechernaya Moskva (USSR) 1964, 12 Feb, p. 2.

Descriptors: (*Cardiovascular agents, Effectiveness), (*Anesthetics, Effectiveness), Drugs, Phenothiazines, Synthesis (Chemistry), Anesthesia, Cardiovascular diseases, Therapy, USSR.

A popularized article concerning the development of several new drugs at the Institute of Pharmacology and Chemotherapy. Included are: 'chloroatsizne', for the treatment of stenocardia and infarct of the myocardium and which does not lower the arterial pressure; 'trimecain', an anesthetic which is effective for periods up to 48 hours.

AD-602 889 Div. 16
OTS Prices: HC $2.00/MF $0.50

Walter Reed Army Inst. of Research, Washington, D. C.
THE EFFECTS OF MASSIVE DOSES OF IONIZING RADIATION UPON CONDITIONED AVOIDANCE BEHAVIOR OF THE PRIMATE.
Behavioral Radiology Lab. Technical rept. no. 3,
by Joseph C. Sharp and Donald L. Daoust. 1963, 37p
NP 14043, N64 15993

Unclassified report

Descriptors: (*Radiation effects, Behavior), (*Behavior, Radiation effects), Primates, Radiological dosage, Conditioned reflex, Motor reactions, Reaction (Psychology), Adaptation (Physiology), Whole body irradiation.

This experiment indicates quite clearly that the use of behavioral indexes, as opposed to survival times, should result in a marked readjustment of the time lines for a realistic evaluation of the effects of ionizing radiation in military and civil defense situations. This conclusion is based on the following assumptions: (1) Complicated or intricate motor manipulations will be severely attenuated by radiation. (2) The shock avoidance paradigm is a powerful motivator and probably should continue to be used in preference to other forms of motivation for animal experimentation in behavioral radiology. (3) The use of behavioral indexes will result in a more valid and pragmatic evaluation of the role of ionizing radiations in military and civil defense situations. (4) The techniques of long-term behavioral control and the quantitative nature of the recorded behavior are valuable new tools for behavioral radiology.

AD-602 901 Div. 16
OTS Prices: HC $1.00/MF $0.50

Albany Medical Coll., N. Y.
CHEMICAL, ULTRASTRUCTURAL AND CLINICAL STUDIES ON A PYROGEN ISOLATED FROM LEUKOCYTES.
Annual rept. no. 1, 1 Jun 63-30 May 64,
by Katherine E. Fritz. 26 Jun 64, 4p
Contract DA18 108AMC157A

Unclassified report

Descriptors: (*Pyrogens, Chemical analysis), (*Antigen-antibody reactions, Pyrogens), (*Luekocytes,

17. Metallurgy

AD-602 336 Div. 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOLDERING OF TITANIUM ALLOY AT-3 WITH APPLICATION OF VARIOUS GALVANIC COVERINGS,
by A. Ya. Shinyaev and V. V. Bondarev. Jun 64, 12p
FTD MT64 48; TT 64 11862

Unclassified report

Edited machine trans. of Titan i Ego Splavy (USSR) 1963, v. 10, p. 317-321.

Descriptors: (*Soldering, Titanium alloys), (*Titanium alloys, Metal coatings), Silver, Rhenium, Rhodium, Antioxidants, Adhesion, Temperature, Mechanical properties, Diffusion, Electrolysis, Corrosion inhibition, Coatings, USSR.

AD-602 361 Div. 17, 26, 31
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
PARTIAL-PENETRATION WELDED CONNECTIONS FOR ALUMINUM COMPRESSION MEMBERS,
by James H. Jennison and Robert S. Gill. Apr 64, 40p
NOTS TP3468; NAVWEPS 8495

Unclassified report

Descriptors: (*Welds, Mechanical properties), (*Welding, Aluminum alloys), (*Structural shells, Compressive properties), Pressure vessels, Cylindrical bodies, Underwater, Hardness, Stresses, Buckling (Mechanics), Strain (Mechanics), Shear stresses, Tensile properties, Joints, Pressure, Heat treatment, Steel.

For aluminum compression members or shell structures that cannot conveniently be heat-treated after welding, partial-penetration welding retains much of the original compressive strength of the structure and is a potentially useful idea for the design of deep-submergence vehicles. Three sets of 1 by 2 by 6-inch 6061-T6 aluminum short columns were butt welded at mid-length with root penetrations of 1/16, 1/8, and 1/4 inches. Compression tests yielded 97, 80, and 72%, respectively, of the strength of a similar one-piece 6061-T6 aluminum column. Additional tests of columns of various lengths with 1/8-inch penetration welds yielded compressive strengths significantly better than similar columns with full-penetration welds. The advantage is greatest in columns of short and intermediate length. The partial-penetration welded connections exhibited enough shear and tensile strength for applications in which the loading is primarily compression. (Author)

AD-602 379 Div. 17, 26
OTS Prices: HC $2.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
A REVIEW OF DIMENSIONAL INSTABILITY IN METALS.
by Frank C. Holden. 19 Mar 64, 46p DMIC M189
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Precision finishing, Metals), (*Tolerances (Mechanics), Metals), (*Metals, Precision finishing), Steel, Tool steel, Stainless steel, Nickel alloys, Copper alloys, Aluminum alloys, Magnisium alloys, Titanium alloys, Machining, Stability, Measurement, Metallography, Control, Phase studies, Heat treatment, Thermal expansion, Elasticity, Creep, Deformation.

This memorandum discusses briefly the mechanisms leading to the dimensional instability of metals and alloys, together with some related phenomena: precision elastic limit, microcreep, and microstrain. Information of this type is needed in the design and manufacture of precision devices, such as bearings, gage blocks, gyros, accelerometers, and components of missile guidance systems. Tables of data from available reports and papers are presented for a number of metals and alloys. These should provide a useful source of information for the selection and processing of metals for applications where a high degree of dimensional stability is required. (Author)

AD-602 397 Div. 17, 32
OTS Prices: HC $3.00/MF $0.75

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Mary F. Banks. Jul 64, 50p
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Metals, Bibliographies), (*Alloys, Bibliographies), Indexes, Abstracts, Refractory metals, Non-metals, Refractory materials, Graphite, Ceramic materials, Coatings, Composite materials, Steel, Stainless steel, Beryllium, Titanium, Magnesium, Aluminum, Nickel alloys, Iron alloys, Mechanical properties.

An annotated bibliography is given on high-strength alloys, light metals, nonmetallics, refractory metals, coatings, and composites.

AD-602 409 Div. 17
OTS Prices: HC $2.00/MF $0.50

Rock Island Arsenal Lab., Ill.
WEIGHT LOSS OF PLATED METALS HEATED IN VACUUM.
Technical rept.,
by R. H. Wolff. 24 Jan 64, 29p
Proj. 1A0 13001A039
RIAL 64 233

Unclassified report

Descriptors: (*Metal coatings, Sublimation), Steel, Coatings, Cadmium, Lead, Nickel, Tin coatings, Zinc coatings, Vaporization, Weight, Vacuum systems.

A series of experiments were conducted with 0.5 mil plated coatings on steel exposed to heat in vacuum. The plated coatings were cadmium, zinc, lead, nickel, and tin. Test conditions were exposure to vacuum at 0.000015 torr and temperatures from 200F to 675F. Periodic weight change measurements were made in room atmosphere using an analytical balance. Only slight variations of weight were observed with tests of lead, nickel and tin. Cadmium volatilized at rates of 3.0 to 7.6 mgm/sq cm day for temperatures at 400F. Zinc coatings behaved in an unusual manner. An initial rate of weight loss occurred at 435F only to decrease to zero at 450F with apparent constant weight. With increased temperature a rate of loss was resumed and rates of 4.5 to 6.5 mgm/sq cm/day occurred at 550F to a total loss of 90% coating weight. (Author)

AD-602 412 Div. 17, 31
OTS Prices: HC $1.50/MF $0.75

Naval Research Lab., Washington, D. C.
METALLURGICAL CHARACTERISTICS OF HIGH STRENGTH STRUCTURAL MATERIALS.

AD-602 965 Div. 16
OTS Prices: HC $1.00/MF $0.50

Royal Coll. of Surgeons of England, London.
FACTORS MODIFYING THE ACTION OF NEUROMUSCULAR BLOCKING AGENTS.
Final technical rept. for 1 Apr 63-31 Mar 64,
by J. P. Payne. 31 Mar 64, 16p
Contract DA91 591EUC2881

Unclassified report

Descriptors: (*Skeletal muscle relaxants, Barbiturates), (*Barbiturates, Skeletal muscle relaxants), Drugs, Anesthetics, Neuromuscular transmission, Muscle relaxants, Cats, Humans, Curare alkaloids, Succinates.

The effect of the intravenous anaesthetic agents thiopentone and the non-barbiturate preparation 1420 (Bayer) on the response to the neuromuscular blocking agents tubocurarine, gallamine, decamethonium and suxamethonium was tested. The frog rectus and the rat diaphragm-phrenic nerve preparations were used for this purpose. In addition the rat diaphragm preparation was used to investigate the neuromuscular blocking action of these drugs. The neuromuscular blocking properties of another intravenous anaesthetic the eugenol derivative G.34075 and a recently synthesised relaxant diallyl-nortoxiferine were also investigated with this preparation. (Author)

AD-602 976 Div. 16, 30
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CONSTRUCTION OF A SIMULATION PROCESS FOR INITIAL PSYCHIATRIC INTERVIEWING,
by N. L. Gilbreath, R. E. Bellman, M. B. Friend and Leonard Kurland. Jun 64, 14p P-2933
Grant NIH GM09608 03

Unclassified report

Paper was presented at the Annual Symposium (2nd) in Biomathematics and Computer Sciences in the Life Sciences, Houston, Texas, May 64.

Descriptors: (*Psychiatry, Training devices), (*Bionics, Psychiatry), (*Medical equipment, Computers), (*Verbal behavior, Diagnosis), Decision making, Medical examination, Simulation, Feedback, Programming (Computers).

A description is given of the application of a computer in simulating a therapist in a patient-therapist relationship during initial psychiatric interviewing. The use of this technique is suggested for training purposes.

AD-602 983 Div. 16, 8
OTS Prices: HC $1.00/MF $0.50

Airborne Instruments Lab., Inc., Deer Park, N. Y.
A STUDY OF RATE-ANALOG PROCESSING METHODS FOR PHYSIOLOGICAL DATA,
by George W. Morton and Robert J. Rosov.
May 64, 10p
Contract AF33 616 10462, Proj. 7222, Task 722203
AMRL TDR-64 10

Unclassified report

Descriptors: (*Monitors, Analog systems), (*Physiology, Monitors), Biophysics, Heart, Pulse rate, Respiration, Signals, Electromagnetic pulses, Waveform generators, Electrocardiography, Pulse counters, Circuits, Design.

Often the most useful information contained in signals of physiological origin is the period or repetition rate of the waveform. This information is not directly apparent through inspection of the raw signal but must be derived by an additional counting or measuring operation. A review of methods of providing a direct indication of rate, including generating trigger pulses from periodic physiological waveforms and techniques for converting the wave-repetition period into a rate analog are presented. Particular attention is given to the electrocardiographic signals as a vehicle for demonstrating a recommended rate analog processor circuit. (Author)

columbium alloys were begun, as was the coating comparison portion of the program. A survey of tantalum producers was conducted and the state-of-the-art in tantalum coatings was reviewed and up-dated. Threaded fasteners of Cb 752 for mechanical property tests were completed with the exception of the threading of the nuts. (Author)

AD-602 521 Div. 17, 25, 30
OTS Prices: HC $1.00/MF $0.50

Illinois Inst. of Tech., Chicago.
SHORT-RANGE FORCES IN ALLOYS.
Summary rept.
by Leonid V. Azaroff. 15 Jul 64, 6p
Contract Nonr1406 07, Proj. NR031 684
Unclassified report

Descriptors: (*Alloys, Atomic structure), (*X-ray absorption analysis, Alloys), Solid solutions, Copper alloys, Nickel alloys, Aluminum alloys, Chromium alloys, Vanadium alloys, Crystal structure, Electron transistions, Atomic energy levels, X-ray spectroscopy, Absorption spectrum, Crystallography.

The power of the x-ray absorption spectra to ellucidate short-range forces operating in alloys having been clearly demonstrated, it remains to apply this method to various alloy systems. In the present instance it appears that a study of transition-metals and their alloys is probably most urgent. This is so because of the very large current interest in these alloys by others. Thus several alloy systems containing the magnetic elements Fe,Co, and Ni will be examined. At the same time, alloys containing copper will be looked into also because of their practical importance and because complementary data is readily available to help characterize them.

AD-602 529 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Michigan Univ., Ann Arbor. Coll. of Engineering.
SINTERING OF METAL OXIDES.
Final rept.
by G. Parravano. Oct 63, 28p ORA 02832 16P
Contract AF49 638 493, Projs. 9762, 02832,
Task 37621
Unclassified report

Descriptors: (*Metals, Oxides), (*Oxides, Sintering), (*Sintering, Oxides), Surfaces, Single crystals, Crystal growth, Powder alloys, Rutile, Titanium compounds, Zinc compounds, Vanadium compounds.

The research program had the following major objectives: (1) To determine the transport mechanisms which control the sintering of a representative group of metal oxides; (2) To relate the observed sintering mechanisms to fundamental properties of the solids (vapor pressure, diffusion coefficients, deviations from stoichiometric composition); (3) To investigate the role of whisker growth in metal oxides on their sintering behavior; (4) To assess the influence of surface effects on sintering in oxide compounds. (Author)

AD-602 532 Div. 17
OTS Prices: HC $2.00/MF $0.50

Materials Research Corp., Orangeburg, N. Y.
VARIATION OF PROPERTIES OF FINE WIRES WITH DIAMETER.
Rept. for 1 May 62-31 May 63,
by G. Abowitz, E. Hughes, P. Barton, and R. Vigue.
Aug 63, 31p
Contract AF33 657 9178, Proj. 7353, Task 735304
ASD TDR63 641
Unclassified report

Descriptors: (*Single crystals, Physical properties), (*Crystal growth, Single crystals), Copper, Silver, Gold, Aluminum, Crystal lattice defects, Stresses, Mechanical properties, Strain (Mechanics), Fracture (Mechanics), Grain structures, Cold-working, Nucleation, Wire.

The growth of face-centered-cubic wire single crystals utilizing the strain anneal technique was investigated, and the values of the various parameters in the process determined. With the exception of aluminum, annealing twins were produced in all the metals examined during the gradient anneal, and acted as obstacles to migrating grain boundaries. Copper crystals .020 in. diameter grown by the above technique were shown to have a preferred orientation, i.e. with their major axis parallel to (100) . This is the cube texture commonly developed in cold worked and annealed copper. Electro and chemical thinning experiments on single crystals of copper grown from both the liquid and the solid have met with some success and are continuing. Etch pit studies revealed pits on (111) faces of copper crystals grown by a modified Bridgman technique. Finally, a 'hard' tensile apparatus is at present being modified to enable the observation of such phenomena as the yield point and the early stages of the stress-strain behavior in addition to fracture properties of the fine wires. (Author)

AD-602 533 Div. 17
OTS Prices: HC $4.00/MF $1.00

Man Labs, Inc., Cambridge, Mass.
MECHANICAL BEHAVIOR OF INTERMETALLIC COMPOUNDS.
Rept. for 15 Oct 62-14 Sep 63,
by L. E. Tanner, J. J. Ryan, I. Vilks and S. V. Radcliffe.
Dec 63, 136p
Contract AF33 657 7432, Proj. 7350, Task 735001
ASD TDR62 1087 P2
Unclassified report

Descriptors: (*Intermetallic compounds, Mechanical properties), (*Refractory materials, Intermetallic compounds), Extrusion, Vanadium compounds, Nickel copounds, Cobalt compounds, Heat treatment, Microstructure, X-ray diffraction analysis, Electron microscopy, Tests, Transformations, Metallography, Crystal structure.

Specimens taken from extrusions of the intermetallic compounds VNi3, VNi2, and VCo3, of stoichiometric composition, were given a series of heat treatments to develop varying degrees of order. Mechanical properties of these specimens were determined at room temperature by means of compression and hardness testing. Structural examinations of these three compounds were started and X-ray diffraction, light microscopy and transmission electron microscopy provided some initial insight into their transformation behavior. The structural dependence of mechanical behavior was reviewed. In addition, preliminary work with off-stoichiometric compositions of VNi3, VNi2 and VCo3 and with stoichiometric V2Ni, V3Ni, VCo and V3Co have been carried out. (Author)

AD-602 556 Div. 17, 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTROCHEMICAL AND CORROSION BEHAVIOR OF STEEL AND NICKEL ELECTRODES IN SOLUTIONS OF SULFURIC ACID, SUBJECTED TO A REACTION OF γ-RADIATION,
by Ya. M. Kolotyrkin, N. Ya. Bune, and G. S. Tyurikov. 6 Dec 63, 14p
FTD MT63 126; TT 64-11924 Unclassified report

Quarterly rept. no. 4, Feb-Apr 64,
by R. J. Goode, R. W. Huber, D. G. Howe, R. W. Judy and T. W. Crooker. Jun 64, 80p
Projs. SR007 01 01 0850; SR007 01 01 0854
NRL 6137

Unclassified report

Descriptors: (*Submarine hulls, Metal plates), (*Steel, Submarine hulls), (*Titanium alloys, Submarine hulls), (*Aluminum alloys, Hulls (Marine)), Test methods, Heat treatment, Maraging steels, Titanium, Fatigue (Mechanics), Rolling (Metallurgy), Welding, Niobium alloys, Tantalum alloys, Toughness, Fracture (Mechanics), Tensile properties, Molybdenum alloys, Tin alloys, Microstructure, Strain (Mechanics).

A progress report covering research studies in high-strength hull structural materials, conducted in the period February 1964 to April 1964, is presented. These studies included the development of preliminary relationships of flaw size and stress for fracture of quenched and tempered steels, maraging steels, and titanium. Preliminary information was developed on the relationships of fracture toughness tests for aluminum. Heat-treatment studies for titanium alloys indicated improvements in fracture toughness for specific levels of yield strength. Evidence that low-cycle fatigue crack growth in a strain-controlled process is presented for specially rolled and heat treated HY-80 steels. (Author)

AD-602 432 Div. 17, 26
OTS Prices: HC $4.00/MF $0.75

Climax Molybdenum Co. of Michigan, Detroit.
ARC-CAST MOLYBDENUM-BASE ALLOYS (1962-1964),
by M. Semchyshen, Robert Q. Barr and E. Kalns. May 64, 125p
Contract Nonr2390 00, Proj. NR039 002

Unclassified report

Descriptors: (*Molybdenum alloys, Heat treatment), (*Heat-resistant metals and alloys, Castings), Refractory metal alloys, Mechanical properties, Aging (Materials), Beryllium alloys, Extrusion, Electron beams, Titanium alloys, Zirconium alloys, Carbides, Carbon alloys, Grain structures (Metallurgy), Thermochemistry, Rolling (Metallurgy), Phase studies, Transition temperature.

The influence of in-process solution and solution and aging treatments on the properties of several molybdenum-base alloys is described. Alloys of molybdenum with titanium and/or zirconium were processed to bar stock by extrusion and rolling procedures. Extruded bars were prepared for rolling to final size either by heating to the minimum recrystallization temperature or by the application of optimum solution or solution and aging treatments. The latter procedures resulted in significantly higher recrystallization temperatures and tensile strengths than the procedure involving recrystallization prior to rolling. The high elevated temperature strengths obtained for the molybdenum-base alloys studied resulted from a critically dispersed carbide phase. A limited amount of work indicated that a dispersion hardenable molybdenum-beryllium alloy could be worked by extrusion. Room temperature hardnesses approaching 500 DPH were developed by the application of the proper solution and aging treatments to the extruded molybdenum-beryllium alloy. (Author)

AD-602 457 Div. 17
OTS Prices: HC $1.00/MF $0.50

Rock Island Arsenal Lab., Ill.
YTTRIUM AS A NODULIZER FOR CAST IRON.
Technical rept.
by W. C. Wurtz. 4 Mar 64, 22p
RIAL 64 730

Unclassified report

Descriptors: (*Iron, Additives), (*Yttrium, Iron), Castings, Microstructure, Mechanical properties, Heating, Silicon alloys, Nickel alloys.

Yttrium metal in varying amounts was added to experimental laboratory heats of cast iron to study operating procedures and related problems involved in its use as a nodulizer. Approximately 0.20 to 0.25 percent yttrium added to the charge produced the most satisfactory microstructure and mechanical properties. Nodular iron made with yttrium has mechanical properties similar to nodular iron made with magnesium. However, the present price of yttrium makes it economically unsound to use for foundry production castings. Materials such as silicon and nickel alloyed with yttrium did not improve the nodulizing efficiency. Superheating the molten bath before adding the yttrium improved the mechanical properties. (Author)

AD-602 478 Div. 17, 26
OTS Prices: HC $1.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
OBSERVATIONS ON DELAYED CRACKING IN WELDED STRUCTURES OF UNALLOYED TITANIUM SHEET,
by R. H. Ernst, D. N. Williams, and H. R. Ogden.
29 Apr 64, 9p DMIC M191
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Welds, Titanium), (*Titanium, Welding), (*Sheets, Titanium), Failure (Mechanics), Fracture (Mechanics), Hydrogen embrittlement, Panels (Structural), Hydrides, Mechanical properties, Electron microscopy, Stresses, Brittleness, Heat treatment, Titanium compounds.

A brief study of delayed fracture in a seam-welded titanium panel is summarized in this memorandum. Examination of the fracture surface with electron microscopy showed that the material cleaved, failing in a brittle manner. Although the nature of the embrittlement was not clearly defined, titanium hydride phase was suspected as a prime contributor to failure. Even though the hydrogen content of the titanium was only 65 ppm, hydride embrittlement was thought to have occurred from precipitation of hydride platelets on crystal planes oriented normal to welding stresses. Other work, briefly discussed in the memorandum, has confirmed that hydride platelets in titanium can be oriented by stress and that tensile ductility of Zircaloy (which behaves similarly with respect to hydrogen, to titanium) depends upon hydride orientation. Stress-relief annealing of welded titanium structures is recommended wherever possible to minimize embrittlement by stress-oriented hydrides. (Author)

AD-602 500 Div. 17, 13
OTS Prices: HC $3.00/MF $0.50

Standard Pressed Steel Co., Jenkintown, Pa.
STRUCTURAL FASTENING TECHNOLOGY.
Progress rept. no. 2, Nov 63-Feb 64,
by T. A. Roach, Jr., M. H. Ortner, and S. J. Klach.
10 Mar 64, 51p
Contract AF33 657 11684

Unclassified report

Descriptors: (*Fastenings, Refractory metal alloys), (*Refractory coatings, Fastenings), Oxidation, Niobium alloys, Tantalum alloys, Molybdenum alloys, Mechanical properties, Tests, Heat treatment, Deformation, Aluminum compounds, Oxides, Chromium, Titanium, Silicon, Silicides, Electrophoresis, Bolts, Locking fastener devices.

The static oxidation portion of the requirement study was essentially completed. Results and conclusions are reported. Manufacture and coating of Cb 752 hardware was completed. Initial tests of deformability of coated

Descriptors: (*Corrosion, Capillary tubes), (*Aluminum alloys, Corrosion), (*Corrosive liquids, Propellants), Dimethyl hydrazine (1-1), Nitrogen compounds, Tetroxides, Water, Chemical reactions, Propellant tanks, Liquid rocket propellants, Oxidizers.

Mechanisms by which corrosion can occur in a capillary of 2014 aluminum are studied. Both experimental and theoretical techniques are employed in the program. The corrosive media are products of the reaction between: (1) water and fuel (a mixture of hydrazine and dimethyl hydrazine); and (2) water and oxidizer (nitrogen tetroxide). With each of these two reacting systems, one may form two displacement systems. In one case the capillary is initially filled with water which is later displaced by propellant. In the other case the capillary is initially filled with propellant which is later displaced by water. The word capillary refers to a crevice of small diameter open at one end to a propellant tank but closed at the other end. This is intended to include weld cracks, weld porosity, or huckbolt patches. Two configurations were considered in detail: a uniform cylindrical hole and a large cavity connected to a propellant tank by a relatively narrow hole.

AD-602 797 Div. 17, 25
OTS Prices: HC $2.00/MF $0.75

Pennsylvania State Univ., University Park.
DIRECT OBSERVATIONS OF FATIGUE INDUCED DEFORMATION FAULTING IN THIN FOIL STAINLESS STEEL.
Final scientific rept. for 1 Jan-31 Dec 63,
by L. E. Murr and P. J. Smith. May 64, 74p
Grant AF AFOSR165 63
AFOSR 64 1004

Unclassified report

Descriptors: (*Foils, Stainless steel), (*Stainless steel, Fatigue (Mechanics)), *(Deformation, Stainless steel), Laboratory equipment, Electron microscopy, Diffraction analysis, Stresses, Evaporation, Vacuum apparatus, Single crystals.

A study was made by transmission electron microscopy of thin foils of 304 stainless steel fatigued external to the electron microscope in reversed bending, and of thin foils fatigued directly within the microscope in alternating tension. The build-up of slip deformation striations and stacking faults in the thin foils during fatigue was correlated with the dislocation structures found in thin films prepared from fatigued bulk specimens. The performance of the special devices designed for fatigue of thin foils so outlined, and the importance of alternative methods of preparation of more uniform fatigue specimens by vapor deposition is emphasized.

AD-602 829 Div. 17
OTS Prices: HC $2.00/MF $0.50

Illinois Univ., Urbana.
EQUILIBRIUM SOLUTIONS OF NITROGEN IN COLUMBIUM-BASE ALLOYS.
Rept. for 15 Mar 63-15 Mar 64,
by E. deLamotte, Y. C. Huang, and C. J. Altstetter.
Jun 64, 28p
Contract AF33 657 10626, Proj. 7351, Task 735106
ML TDR64 134

Unclassified report

Descriptors: (*Niobium alloys, Impurities), (*Nitrogen, Solid solutions), Zirconium alloys, Niobium compounds, Nitrides, Thermodynamics, Heat of formation, Heat of solution, Phase studies, Mechanical properties, Internal friction, Hardness, Quenching (Cooling), Grain structures (Metallurgy).

Thermodynamic and mechanical properties of columbium-nitrogen and columbium-zirconium-nitrogen alloys were determined. The partial pressure of nitrogen in equilibrium with single-phase and two-phase alloys of various binary and ternary compositions was determined as a function of temperature for temperatures between 1500C and 2100C. Heat of solution of nitrogen, heat of formation of Cb2N, and heat of solution of Cb2N values were determined for pure columbium and columbium with 0.86 wt % Zr. Internal friction and hardness were measured for several alloys which had been quenched from above 1500C. For the radiation quench used, solid solutions with 0.075 wt % nitrogen and over could not be retained without precipitation. For the coarse-grained specimens hardness increased from 107 KHN for the pure columbium to 178 KHN for a two-phase alloy containing 0.68 wt % nitrogen. (Author)

AD-602 875 Div. 17
OTS Prices: HC $1.00/MF $0.50

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
FATIGUE OF METALS,
Progress rept. no. 14, 16 Apr-15 Oct 63.
15 Feb 64, 18p
Contract AF33 616 6418

Unclassified report

Descriptors: (Fatigue (mechanics), Iron alloys), (*Iron, Crystal lattice defects), (*Crystal lattice defects, Iron), (*Iron alloys, Fatigue (Mechanics)), Dynamics, Cryogenics, Carbon alloys, Resistance (Electrical), Temperature, Thermal properties, Fracture (Mechanics), Tensile properties, Deformation, Heat treatment, Equations, Anisotropy, Plasticity, Elasticity, Impurities, Hysteresis.

The migrational kinetics of point defects and point defect-impurity complexes in iron and iron-carbon alloys are investigated. Results of the research include a discussion of (1) experimental details; (2) maximum elongation program; (3) resistivity changes with plastic deformation and annealing; (4) elastoresistivity; (5)increase in flow stress upon reloading; (6) effect of plastic deformation at 77K on the electrical resistivity; (7) effect of plastic deformation on Young's modulus; (8) effect of plastic deformation on the elastoresistivity; and (9) resistivity hysteresis during the unload-load cycle.

AD-602 906 Div. 17, 1
OTS Prices: HC $6.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
AIRCRAFT METAL SCIENCE: SECT. IV, CHAPS. 4-13 AND SECT. V, CHAPS. 1-4,
by S. M. Vinarov. 30 Mar 64, 269p
FTD MT63 207; TT 64 71138

Unclassified report

Edited machine trans. of mono. Aviatsionnoe Metallovedenie, Moscow, 1962, p. 271-419.

Descriptors: (*Aircraft industry, Metallurgy), Steel, Stainless steel, Aluminum alloys, Nickel alloys, Chromium alloys, Tungsten alloys, Molybdenum alloys, Manganese alloys, Silicon, Brass, Bronze, Niobium alloys, Magnesium alloys, Titanium alloys, Tin alloys, Heat treatment, Heat resistant metals and alloys, Oxidation, USSR, Physical properties.

Contents: classification and marking of alloyed steels, nickel steel, chromium steels, chrome-nickel steels, chromium-nickel-tungsten, chromium-nickel-molybdenum

Edited machine trans. of Vsesoyuznoe Soveshchaniya po Radiatsionnoi Khimii (All-Union Conference on Radiation Chemistry) (no. 1) Moscow, 25-30 Mar 57. [Trudy] 1958, p. 143-149.

Descriptors: (*Stainless steel, Corrosion), (*Nickel, Corrosion), Radiation chemistry, Sulfuric acid, Electrodes, Electrochemistry, Radiation damage, Gamma rays,USSR.

AD-602 562 Div. 17
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STUDY OF CONTACT CORROSION IN LABORATORY AND NATURAL ATMOSPHERIC CONDITIONS.
by I. L. Rozenfel'd, T. I. Pavlutskaya and L. M. Lapides. 14 Feb 64, 37p
FTD MT63 124, TT 64 11930
Unclassified report

Edited machine trans. of [Akademiya Nauk SSSR]. Institut Fizicheskoi Khimii. Trudy, 1960, v. 8, p. 155-172.

Descriptors: (*Corrosion, Metals), (*Alloys, Corrosion), Atmosphere, Humidity, Protective treatments, Electrodes, Zinc coatings, Aluminum alloys, Steel, Silver, Nickel, Tin coatings, Brass, Bronze, Copper, Chromizing, Cadmium, Magnesium, Mica, USSR.

The corrosion of metals was studied both in the laboratory and in natural conditions. It was confirmed that the influence of contact on speed of corrosion of metals in atmospheric conditions is significant.

AD-602 595 Div. 17, 4, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CLASSIFICATION OF THE SOLUBILITY OF ELEMENTS IN IRON,
by I. I. Kornilov. 30 Mar 64, 19p
FTD MT63 171; TT 64 11966
Unclassified report

Edited machine trans. of A [kademiya] N [auk] SSSR. Izvestiya. Seriya Khimicheskaya, 1945, no. 2, p. 104-112.

Descriptors: (*Iron, Solid solutions), (*Solid solutions, Iron), Iron alloys, Impurities, Chemical elements, Solubility, Atomic properties, Crystal lattices, Chemical bonds, USSR.

The question of the solubility of elements of the periodic system in iron depending upon the relationship of their atomic diameters is considered. Elements which have a difference of atomic diameters not exceeding 8% of the atomic diameter of iron will form with iron continuous solid solutions; a difference from 8 to 15% is characterized by the formation of limited solid solutions, and in the case of a difference exceeding 20%, the elements are not dissolved and are not alloyed. (Author)

AD-602 695 Div. 17
OTS Prices: HC $3.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
SUBSTRUCTURE AND MECHANICAL PROPERTIES OF REFRACTORY METAL WIRES.
Rept. for 1 Apr-30 Oct 63,
by Roy Kaplow, John F. Peck, Frank T. J. Smith and David A. Thomas. May 64, 56p
Contract AF33 657 11238, Proj. 7351, Task 735101
ML TDR64 56
Unclassified report

Descriptors: (*Refractory metals, Wire), (*Wire, Niobium), (*Niobium, Mechanical properties), Microstructure, Hardness, Recrystallization, Grain structures (Metallurgy), Electron microscopy, Strain (Mechanics), Single crystals, Metallography, Crystal structure, Structural properties.

Polycrystalline columbium wires of three levels of interstitial impurity content show steady work hardening in wire drawing to the highest strain obtained, a true strain of 5.1. This behavior contrasts to f.c.c. metals, which show saturation of work hardening at true strains greater than 2. During drawing of random-texture columbium, a fibrous microstructure and the (110) wire texture continually develop. If the material has an initial (110) texture, however, the texture diminishes because of deformation band formation, and subsequent recrystallization produces near-random orientation. Swaged wire also show continued work hardening and develops a cylindrical texture at high strains. Torsion stress-strain curves for both polycrystalline and single crystal columbium have been obtained and the effect of strain reversal studied. A region of work softening was observed in both as-drawn wire and single crystals after reversal of comparable forward strains in drawn wire annealed at 700C or above prior testing. The substructures produced during these experiments were studied by electron microscopy. (Author)

AD-602 726 Div. 17, 14
OTS Prices: HC $2.00/MF $0.50

Purdue Research Foundation, Lafayette, Ind.
PROTECTION OF REINFORCING STEEL.
by L. E. Wood. Sep 63, 42p
ORDL-EC TR2 30
Unclassified report

Descriptors: (*Corrosion inhibition, Steel), (*Steel, Corrosion inhibition), (*Reinforcing materials, Steel), Reinforced concrete, Corrosion, Coatings, Cathodic protection, Antioxidants, Additives, Mechanical properties, Hydroxides, Reviews, Bibliographies.

The study consists of a review of the pertinent literature dealing with the protection of reinforcing steel for the express purpose of determining the present state of knowledge in this area. The information was placed into four general categories: Portland cement concrete, protective coatings, inhibitors, and cathodic protection. Much recent interest was shown in the field of inhibitors for use against corrosion attack. At the present time, this area would seem to be the most fruitful for additional research to evaluate the effectiveness of certain rust inhibiting additives and to determine what effects these additives would have on the mechanical properties of concrete. (Author)

AD-602 782 Div. 17, 4, 10
OTS Prices: HC $2.00/MF $0.50

Martin Marietta Corp., Denver, Colo.
EVALUATION OF THE MECHANISM OF CORROSION IN CAPILLARIES,
Final rept.,
by P. J. Pizzolato, B. K. Larkin, and C. C. Fatino.
22 Jun 64, 46p Martin Cr-64-144
Contract AF04 647 576 Unclassified report

18. Military Sciences and Operations

AD-602 626 Div. 18, 23, 24
OTS Prices: HC $4.00/MF $1.00

Applied Psychology Corp., Arlington, Va.
COMPARATIVE STUDY OF THREE AIRBORNE IMAGE SENSORS.
Final rept.
Jun 64, 150p
Contract AF30 602 3222, Proj. 665A
RADC TDR64 181

Unclassified report

Descriptors: (*Air intelligence, Images), Photographic images, Infrared images, Radar images, Intelligibility, Scale, Resolution, Photographic contrast, Photointerpreters, Training, Performance (Human), Military intelligence.

The report presents an analysis and discussion of issues relevant to planning research to examine the contributions of multisensor imagery to intelligence requirements. Parameters influencing imagery are examined to determine how the influences can be specified in terms of scale, resolution, contrast, or other effects. Experimental designs are presented which allow for expansion and trade-off as subjects and imagery become available. The relevance of ground truth and image truth to image collection system losses and performance evaluation is examination. Finally, a basis is presented for construction of measures of proficiency of image interpreters who will serve as subjects in research on image reconnaissance systems. Such measures can be used to select, match, or train subjects to given levels of proficiency. (Author)

AD-602 657 Div. 18, 32
OTS Prices: HC $4.00/MF $0.75

Vitro Labs., Silver Spring, Md.
INTERIM SUMMARY REPORT. [SUPPLY FACTORS AND DATA REPORTING REQUIREMENTS FOR THE NAVY SUPPLY SYSTEM].
Rept. for 1 May-1 Oct 62,
by A. E. Rupp, Jr., J. H. Scofield, and C. W. Hamby.
1 Dec 62, 113p Vitro TN1744 00 1
Contract Nonr3836 00

Unclassified report

Descriptors: (*Logistics, Data), (*Inventory control, Naval equipment), Malfunctions, Reports, Tables, Documentation, Electronic equipment, Spare parts, Shipyards, Statistical analysis, Supply depots, Military requirements, Naval procurement.

The major purpose of the contract is to investigate failure, replacement, and demand data, and data analysis systems with the objective of developing methods to supply input data to logistics decisions rules. The program includes all Navy systems and all types of equipment.

AD-602 658 Div. 18, 32
OTS Prices: HC $2.00/MF $0.50

Vitro Labs., Silver Spring, Md.
SUMMARY REPORT. [SUPPLY FACTORS AND DATA REPORTING REQUIREMENTS FOR THE NAVY SUPPLY SYSTEM].
Rept. for 1 May-15 Oct 63,
by A. E. Rupp, Jr. and C. W. Hamby. 15 Nov 63, 44p
Vitro TN1744 01 1
Contract Nonr3836 00

Unclassified report

Descriptors: (*Logistics, Data), (*Inventory control, Naval equipment), Naval procurement, Malfunctions, Reports, Tables, Documentation, Spare parts, Military requirements, Supply depots, Statistical data, Data processing systems.

A comparison was made of failure rate, usage rate, and demand rate for a selected number of parts. A study was completed of the data reporting requirements of the Navy supply system, including an estimation of the adequacy of current and proposed reporting systems in supplying these requirements. Replacement rates are being prepared for parts on board the USS Ellison (DD 864) for use in the METRI Program.

AD-602 659 Div. 18, 32
OTS Prices: HC $4.00/MF $1.00

Vitro Labs., Silver Spring, Md.
SUMMARY REPORT. [SUPPLY FACTORS AND DATA REPORTING REQUIREMENTS FOR THE NAVY SUPPLY SYSTEM].
Rept. for 1 May 62-30 Apr 63,
by A. E. Rupp, Jr., C. W. Hamby, and J. H. Scofield.
30 Apr 63, 139p Vitro TN1744 00 2
Contract Nonr3836 00

Unclassified report

Descriptors: (*Logistics, Data), (*Inventory control, Naval equipment), Naval procurement, Electronic equipment, Spare parts, Malfunctions, Reports, Tables, Documentation, Supply depots, Military requirements, Statistical analysis, Costs, Shipyards.

The major purpose of the contract is to investigate failure, replacement, and demand data to develop supply factors applicable to the FBM ship. The report contains tabulations of part replacement rates for electronic equipments, examples of use, a detailed analysis of time variations of replacement rates, equipment variation of replacement rates, a model sensitivity analysis, conclusions as to recommended reporting methods and forms, and a replacement parts cost analysis.

AD-602 814 Div. 18, 22, 30
OTS Prices: HC $8.37/MF $2.25

Planning Research Corp., Los Angeles, Calif.
COMPUTER PROGRAM DOCUMENTATION. ATLANTIC FLEET AUTOMATED AMMUNITION LOGISTICS SYSTEM. MATERIEL RESOURCES SUBSYSTEM FOR CONVENTIONAL AMMUNITION. VOLUME III. PROGRAM LISTINGS (PART 2),
by P. Sterbutzel. Jun 64, 537p PRC R570
Contract Nonr3725 00, Proj. 20L003
NAVCOSSACT 071

Unclassified report

Descriptors: (*Programming (Computers), Logistics), (*Logistics, Programming (Computers)), (*Ammunition, Inventory), Automation, Stock level control, Naval equipment, Inventory control, Computer storage devices, Magnetic tape.

The materiel resources subsystem for conventional ammunition forms an integral part of the Atlantic Fleet automated ammunition logistics system. It generates and maintains magnetic tape files which contain ammunition inventory with history for component part ammunition located on ship and shore stations in the Atlantic Area.

and chromium-molybdenum-alluminum steel, chromium-manganese-silicon-steel (Cromansil), stainless steels, heat-resistant and oxidation-resistant steel and alloys, heat-resistant alloys on a base of refractory metals, tool steel, aluminum alloys, magnesium alloys, titanium and its alloys, copper and antifriction alloys.

AD-602 918 Div. 17
OTS Prices: HC $1.00/MF $0.50

Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
PILOT PRODUCTION AND EVALUATION OF TANTALUM ALLOY SHEET.
Quarterly rept. no. 4, 15 Feb-15 May 63,
by R. L. Ammon and R. T. Begley. 15 Aug 63, 24p
WANL PR-M-005

Contract N600 19 59762 Unclassified report

Descriptors: (*Tantalum alloys, Production), Hafnium alloys, Tungsten alloys, High temperature research, Tensile properties, Metallography, Processing, Heat treatment, Mechanical properties, Carbon alloys, Chemical analysis, Welding, Ductility, Rolling (Metallurgy), Sheets.

This report describes the melting and conversion of 2 ingots of an optimized Ta-W-Hf alloy. This alloy, designated T-222, has the composition Ta-9.6W-2.4Hf-0.01C. Preliminary data indicate that T-222 sheet has excellent high temperature strength, viz., 53,000 psi and 24,900 psi ultimate tensile strength at 2400 and 3000F respectively. The alloy also exhibits excellent cold rolling characteristics and good weldability. TIG welds are fully ductile at-250F over a 2.5T bend radius. Additional evaluation planned for T-222 is described. (Author)

The paper explores some possibilities of increasing blast shelter performance (less cost, more hardness, or both) by using shelter space beyond design capacity. It suggests that shelters might reasonably be overcrowded 150% (5 people in 2 shelter spaces) for extended periods and that more severe options are possible for shorter periods. The study gives some background information showing that shelter designers have radically reduced space allocations during the past few years. An example of overcrowding performance is included. The paper also suggests that physiological stress (heat, humidity, lack of water, etc.) rather than psychological stress is always used as the limiting factor in the utilization of shelter space and that the problem can essentially be by-passed by furnishing shelters with water wells. Overcrowding be given serious consideration in developing shelter programs, since it may result in over-all cost reductions, purchase of harder systems, fast capabilities, higher legacy values, optimum phasing of programs, or a combination of these. Systems using well water and designed for overloading incur small increases over normal shelter costs. (Author)

AD-602 849 Div. 18, 16
OTS Prices: HC $4.00/MF $1.00

Hudson Inst., Harmon-on-Hudson, N. Y.
COLLATERAL DAMAGE.
Final rept.,
by Robert A. Krupka. 11 Jun 64, 136p HI 361-RR/5
Contract OCD OS63 122, Task 4113D
Unclassified report

Descriptors: (*Nuclear warfare casualties, Civilian personnel), (*Population, Nuclear explosion damage), (*Shelters, Costs), Blast, Aerial targets, Civil defense systems, Urban areas, Tables, Mathematical analysis, Military facilities.

The paper presents the methodology and results of a limited study undertaken to determine collateral population damage from weapons aimed at strategic military bases and to roughly estimate the cost of blast shelters to protect everyone at risk. Four sets of calculations are given. The first (Appendix A, labeled 'Rough Computations') contains a detailed listing of bases and cities at risk, plus mortalities computed using census data, target to city distances, and the damage model selected. The second (Appendix B, labeled 'Detail Calculations for Ten Targets') contains the results of refined calculations for some large cities in which each census tract is treated as a population center. The third (Appendix C, labeled 'Adjusted Computations') contains the results of modifying the first set of computations according to the results of the refined computations. The fourth (Appendix D, labeled 'Blast Shelter Cost Computations') contains blast shelter cost calculations for protection against 1-MT and 8-MT attacks. (Author)

AD-602 850 Div. 18, 26
OTS Prices: HC $3.00/MF $0.50

Hudson Inst., Harmon-on-Hudson, N. Y.
THE DESIGN AND PERFORMANCE OF 'OPTIMUM' BLAST SHELTER PROGRAMS.
Final rept.
by William M. Brown. 11 Jun 64, 53p HI 361-RR/2
Contract OCD OS63 122, Task 4113D
Unclassified report

Descriptors: (*Shelters, Costs), Civil defense systems, Mathematical models, Performance (Engineering), Optimization, Military strategy, Blast, Nuclear explosions, Population, Urban areas, Design, Effectiveness.

The paper develops a mathematical model from which the cost of a national blast shelter program for the 213 urbanized areas of the U.S. can be calculated, and from which the effectiveness of the program in providing blast protection for the urban citizens can be quickly found. The paper, by utilizing the idea of equalizing the value of all urban areas as targets (from the enemy point of view), (a) denies the enemy any preferred targets, from the point of view of population mortalities, and (b) provides an important kind of equality of population vulnerability among the urban areas. For any given budget the funds spent for protecting a citizen in a more congested area would be somewhat greater than for those in less congested areas which, normally, would be a less likely target. From a national point of view, it is believed that the design has the advantage of minimizing the number of blast fatalities which an enemy can achieve, and thereby can contribute to the reduction of national vulnerability. To a large extent the design is independent of the size and nature of the assumed attack, although this is less true of the later refinements which involve the use of partial dispersal and crowding. (Author)

AD-602 854 Div. 18, 32
OTS Prices: HC $1.00/MF $0.50

Iowa Agricultural Experiment Station, Ames.
FAMILY ADOPTION OF PUBLIC FALLOUT SHELTERS. A STUDY OF DES MOINS, IOWA.
Rural Sociology rept. no. 30 (Summary of the final rept.),
by Gerald M. Klonglan, George M. Beal, and Joe M. Bohlen. 1964, 17p
Contract OCD OS62 150, Proj. 1529, Task 4811D
Unclassified report

Descriptors: (*Radioactive fallout, Shelters), (*Shelters, Public opinion), (*Civil defense systems, Public opinion), Attitudes, Psychometrics, Sociometrics, Nuclear warfare.

Topics include: framework for analysis, adoption of public fallout shelters (the research population and sample), relation of factors to stage of adoption (Demographic variables and stage of adoption, knowledge variables and stage of adoption, attitude variables and stage of adoption, sources of information and stage of adoption).

AD-602 925 Div. 18
OTS Prices: HC $3.00/MF $0.75

Mitre Corp., Bedford, Mass.
WSPACS AIRCRAFT INTEGRATION MODEL. VOLUME I. MODEL DESCRIPTION,
by E. B. Berman, H. Glazer and T. J. Jannsen.
Jun 64, 82p Mitre TM03929 V001 00 0 00
Contract AF19 628 2390, Proj. 850
ESD TDR64 115
Unclassified report

Descriptors: (*Management engineering, Air force systems command), (*Compilers, Scheduling), (*Operations research, Air force systems command), Systems engineering, Mathematical models, Programming (Computers), Aircraft equipment, Costs, Integration, Models (Simulations).

This document contains a description of the aircraft integration model developed by MITRE for the WSPACS project. The model consists of (1) a reprogramming model used to simulate the impact on schedules and costs of possible reprogramming actions on an aircraft force structure, and (2) a base-case updating model, part of the base-case procedure used to update the contractor data for reprogramming runs. A brief description of the purpose

The subsystem generates inventory reports at the request of and for the use of COMSERVLANT Ordnance Division (Code 20). (Author)

AD-602 837 Div. 18, 6, 24, 28
OTS Prices: HC $4.00/MF $1.00

American Inst. for Research, Pittsburgh, Pa.
THE EXPERIMENTAL EVALUATION OF MULTISENSOR INTELLIGENCE SYSTEMS.
Final rept.
by Lewis D. Hannah, James W. Altman, Robert W. Smith, Eugenia S. Scharf, and Earl L. Seiler. Jun 64, 137p
Contract AF30 602 3223
RADC TDR64 160

Unclassified report

Descriptors: (*Photointerpretation, Human engineering), (*Human engineering, Photointerpretation), (*Military intelligence, Photointerpretation), Aerial reconnaissance, Panoramic cameras, Side-looking radar, Infrared scanning, Images, Display systems, Analysis.

A series of experiments, designed to investigate critical problem areas in the presentation of multisensor intelligence imagery, was designed. The group of sensors considered includes: (1) a panoramic camera, (2) an image-forming side looking radar system, and (3) an image-forming infrared sensing system. The individual problems were studied in the context of the complete multisensor intelligence collecting and evaluation system. Experiments related to the individual problems are presented in three design groups. Design group one is centered on the image-forming characteristics of the sensors under different collection conditions, the characteristics of images formed, and the performance of interpreters as it is related to both of these. Design group two presents a systematic way of determination of optimum values of parameters relevant to the forced scan mode of image interpretation and a way of evaluating the use of this mode, with a scanning device designed on the basis of the derived optimum values. Design group three develops methods to be used in the study of the parameters of the simultaneous presentation of multisensor imagery, and the evaluation of equipment designed for such presentations. .(Author)

AD-602 841 Div. 18, 26
OTS Prices: HC $7.16/MF $2.00

Department of Defense, Washington, D. C.
DOD 'IN HOUSE' VALUE ENGINEERING CONFERENCE HELD 18, 19, 20 FEBRUARY 1964. CONFERENCE PRESENTATIONS,
20 Feb 64, 416p

Unclassified report

Conference sponsored by Director of Productivity and Value Engineering, Office of Asst. Secretary of Defense (Installations and Logistics). A portion of this document is illegible or nonreproducible.

Descriptors: (*Management engineering, Armed forces (United States), (*Symposia, Management engineering), (*Armed forces procurement, Management engineering), Armed forces budgets, Logistics, Installation, Costs, Reduction, Economics.

The presentations described applications of VE techniques at DoD installations that included several Air Materiel Areas, arsenals, shipyards, repair and overhaul facilities, and supply depots. Scores of examples of successful VE applications were discussed.

AD-602 846 Div. 18, 26
OTS Prices: HC $1.00/MF $0.50

Hudson Inst., Harmon-on-Hudson, N. Y.
ON SHELTER COSTS.
Final rept.,
by Robert A. Krupka. Jun 64, 22p HI 361-RR/3
Contract OCD OS63 122, Task 4113D

Unclassified report

Descriptors: (*Shelters, Costs), Functions, Analysis, Blast, Design, Optimization, Civil defense systems.

Studies on optimizing blast shelter programs revealed that a shelter cost-hardness relationship is required in order to design programs and measure their performance. The paper presents the results of a limited effort to develop a simple cost function for blast shelters. As a basis for preparing the relationship, costs overpressures, space allocations, and other significant items were extracted from several previous shelter design studies. A plot of costs versus usable floor area was formulated. The cost of 'fixed' items such as mechanical-electrical equipment, sanitation and water systems, and habitability items were considered. The final cost included overhead, profit and contingencies at 60%, but not the cost of land.

AD-602 847 Div. 18
OTS Prices: HC $2.00/MF $0.50

Hudson Inst., Harmon-on-Hudson, N. Y.
ALTERNATIVE CIVIL DEFENSE PROGRAMS AND POSTURES.
Final rept.,
by William M. Brown. 11 Jun 64, 38p HI 361-RR/1
Contract OCD OS63 122, Task 4113D

Unclassified report

Descriptors: (*Shelters, Design), (*Civil defense systems, Theory), (*Military strategy, Game theory), Warfare, Political science, Blast, Radioactive fallout, Budgets, Tables.

A spectrum of possible CD programs is presented ranging from a minimum (approximately the current survey shelter program) based on a $200 million budget to a maximum sustained national effort, limited only by available resources. To place these alternatives in perspective, some aspects of future contexts within which they might appear desirable are described. Seven specific postures are selected and described in terms of the fallout and blast protection achieved prior to an attack. The two main conclusions drawn are (1) that in some population attacks the emergency improvements in CD capability within the low budget programs have a potential for preserving the nation as an entity and/or most of its urban population; and (2) that the larger programs, based upon blast shelters in or near the urban areas, when properly designed offer a much greater potential for survival of malevolent attacks than has been generally realized heretofore. (Author)

AD-602 848 Div. 18
OTS Prices: HC $2.00/MF $0.50

Hudson Inst., Harmon-on-Hudson, N. Y.
OVERCROWDING POTENTIAL.
Final rept.
by Robert A. Krupka. 11 Jun 64, 30p HI 361-RR/4
Contract OCD OS63 122, Task 4113D

Unclassified report

Descriptors: (*Shelters, Performance (Engineering)), Design, Optimization, Survival, Costs, Volume, Water supplies, Stress (Physiology), Stress (Psychology), Civil defense systems, Human engineering.

19. Navigation

AD-602 551 Div. 19
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEW TYPES OF GYROSCOPES,
by Andrzej Bialecki. 16 Aug 63, 9p
FTD TT63 823; TT 64 11949

Unclassified report

Unedited rough draft trans. of Pomiary, Automatyka, Kontrola (Poland) 1961 [v. 7] no. 1, p. 19-20.

Descriptors: (*Gyroscopes, Design), Elementary particles, Rotation, Magnetic fields, Velocity, Nuclear magnetic resonance, Measurement, Relativity theory, Space navigation, Nuclear magnetic moments.

The article describes construction principles of corpuscular gyroscope and compares the latter with electronic gyroscope. (Author)

AD-602 639 Div. 19, 1
OTS Prices: HC $5.00/MF $1.00

Smiths Aircraft Instruments, Ltd. (England).
INSTALLATION OF THE B.L.E.U. AUTOLAND SYSTEM IN A DC-7 AIRCRAFT FOR THE FEDERAL AVIATION AGENCY.
Progress rept. no. 6 (Final), Dec 60-Jun 62,
comp. by Peter D. Smith. Jun 62, 190p
Contracts FAA BRD300, FAA BRD299

Unclassified report

Descriptors: (*Instrument landings, Automatic pilots), (*Automatic pilots, Aircraft landings), (*All-weather aviation, Automatic pilots), Flight simulators, Automatic navigators, Altimeters, Air traffic control systems, Gyro compasses, Design, Tests, Airborne, Great Britain.

The report summarizes the development and installation of B.L.E.U. Autoland System Components in a DC-7 aircraft. The program of work was broken down under the following headings: simulator study; equipment design study, development and manufacture; systems testing; installation and ground testing; and flight trials (including B.L.E.U. approval trials).

AD-602 682 Div. 19, 1
OTS Prices: HC $4.00/MF $0.75

Ford Instrument Co., Long Island City, N. Y.
NO-GIMBAL FEASIBILITY FLIGHT TEST PROGRAM,
by James Xenakis. Nov 62, 108p
Contract AF33 616 8463, Proj. 5201, Task 520104
ASD TDR62 913

Unclassified report

Descriptors: (*Inertial navigation, Feasibility studies), Navigation computers, Accelerometers, Gyroscopes, Systems engineering, Models (Simulation), Flight testing, Data processing systems, Test equipment.

The program successfully demonstrated the feasibility of a strap-down inertial navigation system and verified the predicted performance of the breadboard model of the system. The report describes the results of eight flight and two ground tests during which approximately 40 hours of system operation, including 20 hours in the air and 20 hours on the ground, were accumulated. A complete description of the flight test and data processing procedure is presented herein as well as a description of special equipment designed for the evaluation program. A brief summary of system operation is also included. Finally, recommendations for follow-up programs, which would investigate improvements in, and certain applications for a No-Gimbal System, are presented. (Author)

AD-602 686 Div. 19, 1
OTS Prices: HC $9.92/MF $3.00

National Aviation Facilities Experimental Center, Atlantic City, N. J.
OPERATION ACCORDION. NAVIGATIONAL ACCURACIES OF CIVIL JET AIRCRAFT OVER THE NORTH ATLANTIC FEB. 1962-SEPT. 1963, VOLUME I.
Final rept., Vol. 1,
by Irving Hirsch, Ronald Braff and O. Marie Des Rosier.
Apr 64, 692p
Proj. 116 30R
FAA RD-64 52 V1

Unclassified report

Descriptors: (*Navigation, Jet planes), (*Jet planes, Navigation), (*Civil aviation, Navigation), Doppler systems, Doppler navigation, Radar, Atlantic Ocean, Horizontal indicators, Tables, Statistical analysis, Standards, Errors, United States, Great Britain, Canada.

The report presents navigational accuracies over the North Atlantic during the period February 1962 through September 1963. The results are based upon data collected from approximately 5,000 Accordion designated civil jet flights of fourteen participant airlines. The measurements were made by four radars, viz., Gander, Goose, OSV Charlie, and Killard. In addition, considerable quantities of data were supplied by the airlines from Accordion flight logs. The administration of Operation Accordion comprised a condominium of the United States, the United Kingdom, and Canada. The primary purpose of the program was to provide information for decisions on current requirements for horizontal separation standards. Subordinate objectives included the procurement of information concerning the affects of different operational and external environments upon navigational accuracy. (Author)

AD-602 743 Div. 19, 1, 8
OTS Prices: HC $3.00/MF $0.50

Radio Corp. of America, Los Angeles, Calif.
FLIGHT TEST OF MODIFIED DTB AND DME FOR ILS.
Final rept.,
28 May 64, 54p
Contract ARDS585, amend. 4, Proj. 115 1 13D

Unclassified report

*A portion of this document is nonreproducible.

Descriptors: (*Instrument landings, Distance-measuring equipment), (*Distance-measuring equipment, Flight testing), (*Radio beacons, Effectiveness), Radio navigation, Landing aids, Radio receivers, Intermediate frequency amplifiers, Timing devices, Pulse analyzers.

The report describes a series of flight tests made to check the validity of the findings of an investigation of 'Accurate DME for use with ILS', AD-427 721. The tests were made with an NSME ground beacon, (Model DTB) supplied by the FAA and an RCA airborne DME (Model AVQ-70), both of which were modicied according to the recommendations of the investigation. The tests were made by measuring the slant distance between the aircraft and the ground beacon, at the instant when the aircraft passed over an accurately surveyed ground check point. The measurements were made by crystal-controlled

of WSPACS and some historical background are also provided. The technical descriptions of the models used to calculate reprogrammed schedules and costs for the subsystem (airframes, propulsion, airborne electronics, and other GFAE) have been documented elsewhere, and so are not presented. Descriptions of the computer programs for the aircraft integration reprogramming model and base-case model are presented in Volume II, Computer Programs. (Author)

20. Nuclear Physics and Nuclear Chemistry

AD-602 398 Div. 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CAPTURE CROSS SECTIONS FOR NEUTRONS WITH ENERGY TO 50 KEV OF SEVERAL STRUCTURAL MATERIALS [AND] ACTIVATION OF VARIOUS MATERIALS DURING THEIR IRRADIATION BY PROTONS WITH ENERGIES OF 660MEV,
by S. P. Kapchigashev, Yu. P. Popov and M. M. Komochkov. 25 Jun 64, 24p
FTD MT64 171; TT 64 11886

Unclassified report

Edited machine trans. of Atomnaya Energiya (USSR) 1963, v. 15, no. 2, p. 120-130.

Descriptors: (*Neutron cross sections, Nuclear spectroscopy), (*Proton beams, Nuclear reactions), Thermal neutrons, Nickel, Copper, Molybdenum, Tungsten, Nuclear resonance, Resonance absorption, Shielding, Fission product activity, Neutron activation, Gamma rays, Beta particles, USSR.

On neutron a spectrometer, by time of delay in lead, capture cross sections of neutrons with energy to 50 kev were measured in nickel, copper, molybdenum, and tungsten. Previously unknown resonances of nickel (2.3 kev), Cu(63) (-100 ev), Mo(98) (12 ev) were discovered, and their parameters were estimated. Radiation widths of resonances of copper at energies of 227 and 580 ev were equal to about 1.6 ev. Resonance integrals of absorption for the studied substances are given. (Kapchigashev and Popov). Activation of materials was measured at various times after their irradiation for a duration of 40 min by protons with energy of 660 Mev. Specific activity calculated for long time of irradiation, depending upon the substance, changed from 15 to 700 micro-g = equiv Ra/g for 1 hr after irradiation by a stream of protons equal to 10 to the 10th power proton/sq cm. sec. Close agreement was observed between calculated and experimental data, both on yield of activity and on speed of its decrease in time. (Komochkov).

AD-602 462 Div. 20
OTS Prices: HC $2.00/MF $0.50

Weston Instruments, Inc., Newark, N. J.
DIGITAL DISPLAY AERIAL SURVEY METER.
Final rept.
Jun 64, 50p
Contract OCD PS64 10, Task 2131F

Unclassified report

Descriptors: (*Radiation monitors, Display systems), (*Display systems, Radiation monitors), Digital systems, Radioactive fallout, Airborne, Meters, Environmental tests, Specifications, Civil defense systems, Dose rate.

Three Digital Display Indicators have been incorporated into the CD V-781 Aerial Survey Meter replacing the three conventional panel meters to display dose rate readings numerically. The Digital Display Indicator contains a D'Arsonval mechanism and an optical system so arranged to provide a projected image on a screen. Readability error is virtually eliminated since only one indicator is visable at a time displaying a discrete reading of dose rate. Each Digital Display Indicator provides 10 distinct values in a two figure display measuring 3/4 inch high by 1/4 inch wide. (Author)

AD-602 464 Div. 20, 25
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
AN INEXPENSIVE AUTOMATIC RECORDING MOSSBAUER SPECTROMETER,
Technical note no. 4,
by J. Lipkin, B. Schechter, S. Shtrikman and D. Treves.
25 Feb 64, 23p
Contract AF61 052 654

Unclassified report

Descriptors: (*Mossbauer effect, Spectrum analyzers), (*Nuclear radiation spectrometers, Electromechanical converters), Absorption spectrum, Amplifiers, Gain, Performance (Engineering), Oxides, Niobium, Chromium, Pulse generators, Nuclear reactions, Doppler effect, Circuits, Radioactive isotopes, Iron, Transducers, Israel.

An automatic recording constant velocity Mossbauer spectrometer for Fe(57) is described. The motor and the velocity sensor are integrated in a specially designed electromechanical unit. Feedback is used to make the velocity proportional to an input voltage. Recorded line widths only 25% larger than the natural width are obtained. (Author)

AD-602 492 Div. 20
OTS Prices: HC $7.00/MF $1.75

General Dynamics/Fort Worth, Tex.
FALLOUT RADIATION ENERGY DISTRIBUTION AS A FUNCTION OF ALTITUDE,
by T. W. De Vries. 15 Jul 64, 357p FZK-187
Contract OCD PS64 31

Unclassified report

Descriptors: (*Radioactive fallout, Distribution), Low altitude, Radioactive isotopes, Cobalt, Cesium, Sodium compounds, Iodides, Mathematical models, Gamma-ray spectra, Dose rate, Photons, Energy, Monte Carlo method, Quantum mechanics, Programming (Computers), Statistical analysis, Radiation monitors, Airborne.

The gamma-ray spectra in the air above a plane containing fallout fission products were calculated as a function of time and altitude. Similar calculations were made with the spectra of cobalt-60 and cesium-137 assumed as source terms. An experiment was designed to measure the spectra calculated for cobalt-60 utilizing eleven cobalt-60 sources and a very sensitive sodium-iodide gamma-ray spectrometer. The results of the calculations indicate that the relative spectra are constant above 800 feet for times after fission greater than one day and, furthermore, that the variation of the dose rate with altitude is constant for this time interval. (Author)

AD-602 587 Div. 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE DYNAMICS OF NUCLEAR POWER INSTALLATIONS,
by P. A. Gavrilov and B. N. Seliverstov. 22 Apr 64, 15p
FTD MT63 342; TT 64-11958

Unclassified report

Edited machine trans. of Atomnaya Energiya (USSR) 1963, v. 15, no. 2, p. 115-120.

Descriptors: (*Nuclear power plants, Experimental data), Power plants (Establishments), Technological intelligence, Dynamics, Steam generators, Mathematical models, Partial differential equations, Heat transfer, USSR.

In this article the results are compared of experimental and theoretical investigations of the dynamic characteristics

timing equipment of high accuracy which measured the time of arrival of the reply pulse. The passage of the aircraft over the ground check point was established by an optical drift sight. Simultaneous photographs of the check point and the display of the timing device were taken. The results show that an accuracy which is superior to that predicted by the report and superior to the value requested by the FAA can be achieved easily. (Author)

AD-602 944 Div. 19, 8
OTS Prices: HC $4.00/MF $0.75

Aerospace Corp., Los Angeles, Calif.
BELL IIIB ACCELEROMETER EXPERIMENTS,
by R. S. Bovitz. 15 May 64, 103p TDR269 4250 33 1
Contract AF04 695 269
SSD TDR64 37

Unclassified report

Descriptors: (*Accelerometers, Tests), Design, Performance (Engineering), Mathematical models, Correlation techniques, Test equipment, Tests, Data, Reduction, Errors, Guidance.

An experimental investigation was conducted of the performance characteristics of the Bell IIIB accelerometer and the characteristics were related to those of the mathematical model of the instrument. The investigation included an analysis of the instrument and derivation of its model, discussion of test instrumentation and instrument limitations, data collection and reduction techniques, and interpretation of the results of the experimental work. Data on the instrument taken prior to the Aerospace tests and supplied by Bell Aerosystems are included. Correspondence of the test data was reasonably good. Initially, however, changes in accelerometer coefficient values occurred during the test period. Criteria for improved instrumentation and procedures were developed. (Author)

21. Nuclear Propulsion

AD-602 446 Div. 21
OTS Prices: HC $4.00/MF $0.75

General Technologies Corp., Alexandria, Va.
RE-ENTRY BURN-UP MODEL FOR A HYDRIDED ZIRCONIUM-URANIUM FUEL ELEMENT,
Final rept.
by H. M. Childers, L. C. McCandless, and H. S. Jacobs.
Jun 64, 109p
Contract AF29 601 5907, Proj. 1831, Task 183101
WL TDR64 15

Unclassified report

Descriptors: (*Nuclear propulsion, Reactor fuel elements), (*Reactor fuel elements, Atmosphere entry), Space propulsion, Reentry vehicles, Trajectories, Reactor fuels, Uranium alloys, Zirconium alloys, Combustion, Cooling, Heat of fusion, Dissociation, Recombination reactions, Mass transfer.

The problem of describing the re-entry behavior of a hydrided zirconium-uranium fuel element of the SNAP 2 and 10A variety in an analytical form suitable for computer application is studied with special emphasis placed on the chemical interactions of the fuel with the re-entry environment. General re-entry equations are presented. The trajectory and angular-motion equations are written in a form that includes effects from transpiration cooling, heats of fusion, evaporation, dissociation, recombination, chemical reactions, and mass accretion (or loss). All pertinent parameters are evaluated insofar as available data will permit. The rate of hydrogen transpiration, the heat energy added to the fuel element due to recombination of the transpired hydrogen, and the vapor pressure of molten fuel material could not be determined with reasonable accuracy from the available data. It is recommended that these three parameters be determined through laboratory experiments and used in the model described to determine whether or not the fuel elements will burn up during re-entry. (Author)

AD-602 678 Div. 21, 18
OTS Prices: HC $6.00/MF $1.25

Air Force Weapons Lab., Kirtland, AFB, N. Mex.
MILITARY NUCLEAR POWER PLANTS,
by John D. Belson. Jun 64, 247p
Proj. 2800
WL TDR64 25

Unclassified report

Descriptors: (*Nuclear power plants, Military requirements), Logistics, Military personnel, Operators (Personnel), Training, Safety, Costs, Operation, Specifications, Performance (Engineering), Propulsion.

This report was designed primarily to assist both Air Force planning groups and civil engineering functions in the proper adaptation of nuclear power to satisfy their requirements. Air Force, Army, and AEC interrelationships within the nuclear power program are discussed along with development and procurement procedures. Selection standards and training requirements for nuclear power plant operators and officer-in-charge are presented. Cost curves have been included to aid in estimating the capital and operating costs of nuclear and conventional power plants and the breakeven fuel-oil prices for nuclear versus fossil-fuel plants. The capabilities of nuclear power within existing technology are evaluated and possible areas of application discussed. (Author)

of the technological stand of the Beloyarskaya atomic power station with nuclear superheating of steam, constructed in the USSR. The validity of a number of simplifying assumptions frequently applied in the consideration of the dynamics of nuclear-power installations is proven. Results of the investigations can be used for theoretical analysis of the dynamic characteristics of certain types of nuclear-power installations and also for the analysis and synthesis of optimum systems of control. (Author)

AD-602 717 Div. 20, 26
OTS Prices: HC $0.75/MF $0.50

Rock Island Arsenal Lab., Ill.
LIQUID SCINTILLATION COUNTING APPLIED TO RADIOMETRIC TOOL WEAR TESTING.
by W. Dennis Mc Henry. 4 Mar 64, 18p
Proj. 1A010501B010
RIAL 64 729

Unclassified report

Descriptors: (*Scintillation counters, Liquids), (*Cutting tools, Life expectancy), (*Friction, Test methods), Nuclear radiation spectrometers, Metals, Tracer studies, Radioisotopes, Solutions.

Liquid scintillation techniques are shown to be approximately 20 times more sensitive than solid crystal techniques for the determination of beta activity in metal chips cut with an irradiated tool bit. Relative tool wear can be determined easily by simply immersing the metal chips in a suitable counting solution. Total wear can be determined accurately by extracting the radioactive tracer from the chips and comparing it with the specific activity of the tool bit. (Author)

AD-602 890 Div. 20
OTS Prices: HC $4.00/MF $1.00

General Dynamics/Fort Worth, Tex.
COLD WEATHER DECONTAMINATION STUDY - McCOY IV, PART I,
by J. L. Meredith, J. C. Maloney, Howell G. Bradbury and William R. Miller. Apr 64, 141p
Contract OCD OS63 21
NDL TR58 P1

Unclassified report

Descriptors: (*Radioactive fallout, Decontamination), (*Decontamination, Cold weather tests), Simulation, Lanthanum, Sand, Snow, Snow removal, Ice, Freezing, Pavements, Roofs, Dose rate, Maintenance equipment, Meteorological equipment, Meteorological parameters, Compressed air, Radiation measurement systems, Health physics, Experimental data, Statistical analysis.

The objectives of the project were to conduct experiments and to collate data pertaining to radiological decontamination under cold-weather and thrawing conditions. The specific objective of this phase of the project was to determine better methods for decontaminating specific surfaces; effectiveness was based on amount of contamination removed and the effort expended. This project tested additional types of surfaces and conducted multiple-effort experiments to supplement previous work. A series of tests were conducted at Camp McCoy, Wisconsin, to determine the effectiveness of maintenance, snow-removal, fire-fighting, and manual equipment to decontaminate snow, ice, frozen and thrawing ground, paved surfaces, and roofs. The conclusions, based on experimental results, are reported.

AD-602 897 Div. 20
OTS Prices: HC $6.00/MF $1.50

General Dynamics, Fort Worth, Tex.
COLD WEATHER DECONTAMINATION STUDY, McCOY IV, PART II,
by J. L. Meredith, J. C. Maloney, Howell G. Bradbury, and William R. Miller. Apr 64, 288p
Contract OCD OS63 21
NDL TR58 P2

Unclassified report

Descriptors: (*Radioactive fallout, Decontamination), (*Decontamination, Cold weather tests), Roofs, Radiation measurement systems, Dose rate, Scanning, Cesium, Radioactive isotopes, Radioactive decay, Pavements.

The test-plot and roof decontamination data measured with the anthracene scintillation detector are presented. Ion-chamber test-plot data and Ion-chamber dose rates (along with ASD and Cutie Pie readings) are given for the Infinite Plane Source test the Foxhole tests. Cutie Pie readings down the centerline of each contaminated test plot and those taken after decontamination of the plots used for Tests, J, O, X, and Z are given. The short-term vertical and horizontal migration of fallout deposited on snow and ice and the long-term migration of simulated fallout material were investigated. A series of measurements was made of the surface concentration (micromicrocuries per square inch) of fallout simulant migrating horizontally from deposits on snow-covered pavements, turf, and roofs. The tests also included vertical-migration measurements over snow-covered turf.

TYPE SETBACK-LEAF SYSTEM,
by A. Hausner. 10 Jun 64, 41p
Proj. 1P523801A300
HDL TR1232

Unclassified report

Descriptors: (*Proximity fuzes, Arming devices), (*Arming devices, Friction), Mortar fuzes, Tests, Analysis, Fuze auxiliary equipment, Velocity, Wire, Functions, Vibration, Parachutes, Centrifuges, Shafts, Bearings, Brass, Stainless steel, Acceleration, Safety devices.

Preliminary to a design of a setback-leaf system for the XM532 S and A unit to withstand the parachute malfunction requirement, an examination of frictional effects in a T293-type setback-leaf system was made. It was found by analog computation that a coefficient of friction function could be used in analytic expressions to compute arming times in excellent agreement with the arming time of the leaf system obtained under ambient conditions in a centrifuge. Attempts to ascertain if the arming time of the leaf system under actual firing conditions was also in agreement when this function was used failed due to instrumentation difficulties. (Author)

AD-602 664 Div. 22
OTS Prices: HC $2.00/MF $0.50

Naval Weapons Lab., Dahlgren, Va.
A HEAT TRANSFER MODEL STUDY OF THE HOT WIRE INITIATOR,
by J. M. Massey, Jr. 6 Jul 64, 43p
NWL 1919

Unclassified report

Descriptors: (*Explosives initiators, Heat transfer), Fuze functioning elements, Wire, Mathematical models, Programming (Computers), Cartridges (PAD), Detonation, Sensitivity.

A mathematical heat transfer model, applicable to determining the sensitivity to input current of a hot wire initator, is developed. Simplifying assumptions are introduced which make the model amenable to solution using a medium size analog computer. The model is applied to the MARK 45 MOD O impulse cartridge. Solutions are compared to empirical sensitivity data for this cartridge conditioned at -80F, 68F and 225F. (Author)

AD-602 665 Div. 22, 25
OTS Prices: HC $3.00/MF $0.75

Harry Diamond Labs., Washington, D. C.
INVESTIGATION OF 1551B SPIKE NOISE.
Interim rept. no. 1,
by Martin J. Reddan and Ronald Bernstein.
27 May 64, 60p
Proj. 96300
HDL TR1211

Unclassified report

Descriptors: (*Oscillators, Noise), (*Spikes, Noise), Fuze functioning elements, Thyratrons, Shock waves, Sound, Test methods, Tests.

Tests were made to determine the dependence of the occurrence of noise in the 1551B tube on physical shock. The tube was exposed to 3000-g shock produced by air gun firings into a lead target. Controlled tests did not indicate any tendency for noise to occur subsequent to firing. Noise pulses from an undetermined source were occasionally observed, however. Several different types of noise train were observed, and spectral analysis disclosed that their frequency components appeared to lie below 2000cps. (Author)

AD-602 687 Div. 22, 3, 4
OTS Prices: HC $7.39/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FOUNDATIONS OF PYROTECHNICS,
by A. A. Shidlovskii. 30 Apr 64, 439p
FTD TT63 758, TT 64 71119

Unclassified report

Unedited rough draft trans. of mono. Osnovy Pirotekhniki, Moscow, 1954, 284p.

Descriptors: (*Pyrotechnics, Textbooks), Incendiary mixtures, Primers, Combustion, Oxidizers, Chemical reactions, Stability, Storage, Colored smokes, Illuminating projectiles, Sensitivity, Thermochemistry, Explosive materials, Tracers (Ordnance), Classification, USSR.

The first part of the book presents information concerning the principles on which pyrotechnic compounds are constituted, a classification for them and their physicochemical properties, with common reference to all types of compositions. The second part of the book is devoted to a description of the individual types of pyrotechnic compositions, their specific properties and the specifications set forth for them.

AD-602 740 Div. 22, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOURCE OF HIGH-INTENSITY PROTONS,
by R. A. Demirkhanov, Yu. V. Kursanov, and V. M. Blagoveshchenskii. 10 Jul 64, 12p
FTD TT64 586, TT 64 71129

Unclassified report

Unedited rough draft trans. of Pribory i Tekhnika Eksperimenta (USSR) 1964 [v. 9] no. 1, p. 30-33.

Descriptors: (*Ion sources, Design), (*Proton beams, Ion sources), Protons, Ion beams, Plasma oscillations, Emissivity, Ionic current, Electromagnetic lenses, Electrodes, Particle accelerators, USSR.

An ion source with a 1.5-a proton emission current is described. The results of investigating the emission properties of the source and the pulse operating regime are given. (Author)

AD-602 763 Div. 22, 7
OTS Prices: HC $4.00/MF $0.75

Army Frankford Arsenal, Philadelphia, Pa.
DEVELOPMENT OF ELECTRICALLY INITIATED ESCAPE SYSTEM COMPONENTS: IGNITION ELEMENTS T14E2, T19E1, T14E3, T19E2, XM21, XM22, and XM42, PULSE GENERATORS XM10, XM11, AND XM15.
Rept. for Mar 59-Jun 62,
by Alonzo E. White. Jun 64, 107p
AFA R1725; SEG TDR64 28

Unclassified report

Descriptors: (*Fuze functioning elements, Electric igniters), (*Electric igniters, Firing circuits), (*Pulse generators, Design), Performance (Engineering), Environmental tests, Military requirements, Miniature electrical equipment, Electric primers, Propellant, Actuators, Tests.

Frankford Arsenal has developed a series of electric ignition elements which, when supplied with sufficient

22. Ordnance

AD-602 339 Div. 22
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE CHEMICOKINETIC BASIS FOR THE DIFFERENCE BETWEEN PRIMARY AND SECONDARY EXPLOSIVES.
by K. K. Andreev and M. S. Plyasunov. 16 Jun 64, 8p
FTD TT64 328; TT 64 11865

Unclassified report

Unedited rough draft trans. of Vsesoyuznoe Khimicheskoe Obshchestvo. Zhurnal (USSR) 1963, v. 8, no. 5, p. 586-587.

Descriptors: (*Explosive materials, Combustion products), (*Explosives initiators, Combustion products), Explosive gases, Nitrogen compounds, Oxides, Temperature, Heat, Pressure, Oxidation-reduction reactions, Reaction kinetics, USSR.

The composition of the gaseous products of combustion of a number of secondary and initiating explosive substances was determined, mainly at atmospheric pressure. The combustion took place in a test tube filled with nitrogen and connected with a rubber balloon to which the gaseous products of the combustion were passed. The results of the analyses and also the computed temperatures of the combustion are given in a table. To make the picture more complete, there are included in the table data obtained earlier for some nitroesters. In the case of all the secondary explosive substances the greater part (from 100 to 50%) of the nitrogen is given off in the form of oxide. The initiating explosive substances either do not form (mercury fulminate), (trinitrotriazidobenzene) nitric oxides or they form them to a very small extent. Potassium picrate in this relationship (as in accordance with its position between secondary and initiating explosive substances) occupies an intermediate place.

AD-602 358 Div. 22, 20, 25
OTS Prices: HC $2.00/MF $0.50

Aerospace Information Div., Washington, D. C.
NUCLEAR WEAPONS EFFECTS: COMPILATION OF ABSTRACTS, JAN 56-MAR 64.
Rept. no. 1,
1 Jul 64, 26p
AID P64 44; TT 64 11877

Unclassified report

Surveys of Soviet-Bloc scientific and technial literature.

Descriptors: (*Nuclear explosions, Explosion effects), (*Abstracts, Nuclear explosions), Nuclear explosion damage, Shock waves, Propagation, Gases, Solids, Materials, Meteorites, Models (Simulations), Heat transfer, Thermal radiation, USSR.

Thirty-one abstracts of Soviet papers (published between Jan. 1956 and Mar. 1964) are given under the following headings: Structure and parameters of strong shock waves in gases; Parameters of strong shock waves in solids; Propagation of strong shock waves; Interaction of strong shock waves with materials; Nuclear explosion effects; The meteorite analogy; Radiative heat transfer.

AD-602 570 Div. 22, 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATIONS ON THE TRANSITION OF BURNING OF EXPLOSIVES INTO EXPLOSION,
by K. K. Andreev and S. V. Chuiko. 25 Feb 64, 21p
FTD MT63 243; TT 64 11938

Unclassified report

Edited machine trans. of Zhurnal Fizicheskoi Khimii (USSR) 1963, v. 37, no. 6, p. 1304-1310.

Descriptors: (*Explosive materials, Powders), (*PETN, Burning rate), (*Tetryl, Burning rate), Nitrocellulose, Nitramines, Heat of reaction, Reaction kinetics, Transition temperature, Transport properties, Porous materials, Pressure, Explosions, Explosion gases, USSR.

By a method of photographic registration of its speed and character the burning is studied, at constant increased pressures of inert gas (nitrogen) of three powdery secondary explosives --PETN, hexogen, and tetryl. In the region of low pressures the burning of powdery explosives of low density in speed and character does not differ from the burning of solid explosives. Above a certain pressure, increasing with an increase of relative density and a decrease of dimensions of particles, burning changes into accelerated regime. The average speed of burning in accelerated regime 10 -- 100 times exceeds the speed of normal burning, within limits of the charge is approximately constant and grows differently with pressure depending upon density and dimensions of particles. In the studied range of pressures (to 1000 technical atmospheres) and dimensions of charge, burning at constant pressure did not change into explosion. The relative stability of burning of powdery explosives at constant increased pressures in a significant measure is determined by the growth of dilution by inert gas with an increase of pressure. (Author)

AD-602 620 Div. 22
OTS Prices: HC $2.00/MF $0.50

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
CHARACTERISTICS OF CONDUCTIVE EXPLOSIVE MIXTURE CONTAINING MODERATE AMOUNTS OF ALUMINUM,
by Henry J. Jackson. Jul 64, 30p
Proj. 503 05 021
PA TM1337

Unclassified report

Descriptors: (*Explosive materials, RDX), (*RDX, Aluminum), Primers, Detonators, Firing mechanisms, Resistance (Electrical), Pressure, Voltage, Capacitance, Electrical conductance, Power, Tests, Experimental data.

An examination of some of the parameters which affect the electrical initiation of a conductive explosive mixture was made. The conductive mixture was RDX/aluminum 80/20. Some parameters were arbitrarily held constant, since the effort was concentrated on parameters which were considered most critical in the initiation. The effects of energy, voltage, and power were studied. The tests show that, for a given condition, power is an important factor. Also that, for a given energy, there is a critical voltage and capacitance for effective energy transfer. Secondly, the results show that the diameter and column length of the conducting layer are related to the probability of fire for a given applied energy and loading pressure, and that a mathematical expression of this relationship, when plotted, gives a normal sensitivity curve. Finally, 0.50 joule was found sufficient to initiate a conductive RDX/aluminum 80/20 mixture. (Author)

AD-602 624 Div. 22
OTS Prices: HC $2.00/MF $0.50

Harry Diamond Labs., Washington, D. C.
ANALYSIS OF FRICTION AND ARMING TIME IN A T293-

23. Personnel and Training

AD-602 431 Div. 23
OTS Prices: HC $4.00/MF $0.75

Georgia Inst. of Tech., Altanta. Engineering Experiment Station.
RESEARCH DESIGN TO FORECAST DEMAND FOR NEW TYPES OF TECHNICIANS IN AN INDUSTRY.
Research rept.
by John L. Fulmer, Robert E. Green and Paul B. Han.
29 Feb 64, 108p
Contract MDTA19 63

Unclassified report

Descriptors: (*Technicians, Industrial research), (*Manpower studies, Textile industry), Statistical analysis, Engineering personnel, Scientific personnel, Economics, Data, Job analysis, Industrial training, Management engineering, Personnel management.

The objective of the study was to develop a research design in broad outline form which can be employed to detect, define, and forecast the need for emerging new technicians including planned sources of supply. A secondary objective was to develop the research design to provide information on upgrading of skilled workers, displacement of skilled or technical workers, and new types of skilled or technical workers to be employed in support of the new technician. (Author)

AD-602 447 Div. 23
OTS Prices: HC $2.00/MF $0.50

Personnel Research Lab. (570th), Aerospace Medical Div., Lackland AFB, Tex.
ELECTRONIC ENGINEER JOB TYPES IN THE AIR FORCE SYSTEMS COMMAND,
by Francis D. Harding and Robert L. Downey, Jr.
Mar 64, 33p
Proj. 6755, Task 675501
PRL TDR64 8

Unclassified report

Descriptors: (*Job analysis, Engineering personnel), (*Engineering personnel, Electronics), Personnel management, Training, Education, Air force personnel, Officer personnel, Government employees, Distribution, Computers.

As a basis for developing carreer-progression patterns for engineering officers, each electronics engineer working within the systems command completed a check-list of his job activities and a questionnaire about appropriate training, previous experience, and the most desirable next assignment. By a computerized grouping technique, the 1664 individuals responding were clustered into 14 job types. Each job type is described by the pattern of job activities performed and the consensus about desirable previous experience and future assignments. These descriptions show that over 70% of the electronics engineers work as project officers, contract managers, and administrators rather than at instrumentation and research. The consensus of the respondents was that R and D or engineering management training and experience are important prerequisites for job types such as project officer and program administrator. (Author)

AD-602 537 Div. 23, 6, 8
OTS Prices: HC $2.00/MF $0.50

Lockheed Electronics Co., Plainfield, N. J.
THE CHECKOUT AND MAINTENANCE (CAM) TRAINER. II. DESCRIPTION AND FUNCTIONAL CHARACTERISTICS,
by Paul R. Richard and John L. Moss. Jul 63, 38p
Contract AF33 616 7584, Proj. 1710, Task 171004
AMRL P51; AD 417 417

Unclassified report

Descriptors: (*Maintenance, Training devices), (*Training devices, Electronics), (*Electronic equipment, Maintenance), Radar equipment, Maintenance personnel, Design, Errors, Circuits, Simulation, Electronic equipment, Checkout procedures.

The Checkout and Maintenance (CAM) Trainer is a major device that has been specially constructed for research on electronic maintenance. The device has been designed to support research on problems such as: determining the major sources of difficulty in electronic maintenance, specifying the most efficient techniques and devices for training and aiding electronic maintenance personnel, and developing effective techniques for evaluating the proficiency of personnel performing electronic maintenance. The major components of the CAM Trainer are an operational AN/ASB-4 radar system, a student console teaching device for presenting information relevant to the operation of the ASB-4 system, an experimenter's station for recording data and controlling the operation of the student console, and special malfunction generation equipment for inserting controlled malfunctions into the ASB-4 system. This report describes the major components of the CAM Trainer, their interrelationships and functional characteristics. Schematic diagrams relevant to the Trainer are also presented. (Author)

AD-602 539 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Cincinnati Univ., Ohio.
SHORT-TERM MEMORY AS A PREDICTOR OF TROUBLESHOOTING SKILLS,
by R. J. Senter and B. R. Bernstein. Jul 63, 9p
Contracts AF33 616 6835, AF33 616 7674, Proj. 1710, Task 171004
AMRL P-53; AD 417 418

Unclassified report

Descriptors: (*Transfer of training, Psychometrics), (*Memory, Psychometrics), Learning, Training, Personnel management, Test construction (Psychology).

As an adjunct to research on transfer of troubleshooting skill, a battery of tests (both standard and new) was administered to subjects in an attempt to develop tests for the selection of personnel most suited for learning to troubleshoot. The report describes one of the new tests, a test for short-term memory, and indicates its value as a predictor of learning to troubleshoot. The Short-Term Memory Test consisted of 21 subtests, or sets of different items. Each subtest was studied by the subject for a specified short period, then it was removed and the subject's memory of the materials was tested. Various types of tests of memory were used, e.g. reconstruction, true-false, multiple choice, etc. Performance on the Short-Term Memory Test correlated significantly with some measures of learning to troubleshoot some equipment. Higher correlations were obtained when subjects received incentive pay for better performance on the Short-Term Memory Test. Under the condition of incentive pay, the correlations between short-term memory and learning to troubleshoot were generally comparable to the correlations obtained between learning to troubleshoot and standard tests of symbolic reasoning and verbal reasoning. (Author)

AD-602 690 Div. 23, 32
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

electrical energy, are capable of initiating cartridges or mechanisms designed for use in propellant actuated escape systems. Pulse generators, capable of providing the electrical energy necessary to fire these ignition elements, were developed for use as an auxiliary power source. The main advantages of the electrically initiated escape systems over the existing gas systems are: considerable reduction in size and weight in the system for transmission of actuating energy, faster operating times, and providing a means for system continuity checkout. This report is presented in two parts. The first part describes the development and testing of ignition elements T14E2, T19E1, XM21, XM22, and XM42. The second part presents the test procedures, data design, and performance characteristics of pulse generators XM10, XM11, and XM15. The ignition elements and pulse generators functioned reliably within the proposed military requirements. (Author)

AD-602 887 Div. 22, 25
OTS Prices: HC $1.00/MF $0.50

Pennsylvania State Univ., University Park.
THEORETICAL ANALYSIS OF INTERNAL BLAST WAVES IN SPHERES.
Quarterly progress rept. no. 9, 1 Jan-31 Mar 64,
by Norman Davids. 31 Mar 64, 3p
Contract DA36 034 ORD3576RD
Unclassified report

Descriptors: (*Shock waves, Propagation), (*Blast, Shock waves), (*Spheres, Loading (Mechanics)), Mechanical waves, Explosions, Detonation waves, Metals, Equations of state, Special functions (Mathematical), Programming (Computers), Theory.

This project is concerned with a theoretical study on the propagation of waves produced by an explosion in a spherical cavity in a metal. The purpose of such a study is to help find reliable criteria for extrapolating internal blast loading behavior to larger spherical containers. This study is being done concurrently with an experimental investigation on 7 inch and 10 inch spheres at BRL. Research includes; spherical elastic waves, spherical plastic waves, shock waves and detonation waves, and mathematical theory.

AD-602 920 Div. 22, 7, 12
OTS Prices: HC $4.00/MF $0.75

Aerojet-General Corp., Downey, Calif.
FEASIBILITY STUDY OF A STAND-OFF GAP SWITCH IN EXPLODING BRIDGEWIRE INITIATOR.
Summary rept.,
by Theodore N. Bryla. 18 Dec 62, 116p AGC 0539 01 06FP
Contract N123 62738 26854A Unclassified report

Descriptors: (*Exploding wires, Electric switches), (*Electric switches, Exploding wires), (*Explosives initiators, Exploding wires), Feasibility studies, Guided missile components, Guided missile safety, Circuits, Voltage, Design, Environmental tests, Models (Simulations), Production, Coaxial cables, Electric connectors, Electrical properties, Coatings, Aluminum compounds, Oxides.

The investigations were conducted to establish the feasibility of incorporating a high voltage switch within the electrical header of an exploding bridgewire initiator and to determine the electrical capabilities of the voltage switch to meet missile safety and functional requirements. Two types of high voltage switches were designed, developed, and fabricated within the electrical header of an EBW initiator. The electrical capabilities of these voltage switches were evaluated under various environmental conditions. Their conformance to the required design parameters established the feasibility of including a high voltage switch within the electrical header. Various stand-off gap switch (SOGS) and stand-off voltage switch (SOVS) engineering models were studied in the feasibility investigation. Fifty prototype SOVS initiator headers of the final design configuration were fabricated. These units, designed for a coaxial input, utilize the electrical voltage breakdown characteristics of an aluminum-oxide coating for the voltage switch. (Author)

AD-602 947 Div. 22, 20
OTS Prices: HC $7.31/MF $2.00

Stanford Research Inst., Menlo Park, Calif.
SURVEY OF THE THERMAL THREAT OF NUCLEAR WEAPONS,
by Jack C. Rogers and T. Miller. Nov 63, 431p
Contract OCD OS62 135, Proj. IMU4021, Task 3
Unclassified report

Descriptors: (*Nuclear weapons, Thermal radiation), (*Thermal radiation, Nuclear weapons), Nuclear explosion damage, Meteorological phenomena, Targets, Vulnerability, Fires, Flame propagation, Damage, Countermeasures, Shelters, Health physics.

This paper reviews the current state of knowledge on the thermal effects of nuclear weapons, atmospheric transmissivity, ignition of target elements, and fire propagation and spread. Some of the topics considered are: Importance of attack assumptions (delivery capabilities of the enemy, warhead types and yields, altitude of detonation, timing, and warning) in determining the characteristics of thermal radiation and the susceptibility of targets to thermal damage. Modification of the thermal radiation by the atmosphere, intervening cloud layers or other meteorological features, and target elements, such as trees and topography. Interaction of blast, radioactivity, and thermal radiation phenomena. Response of target elements to direct thermal radiation. Effects of weather and topography on target vulnerability and fire spread. Fire development and spread in target areas. Vulnerability of humans. Countermeasures. (Author)

Research effort resulted in the implementation of a number of operational measures of military trainability: successive forms of the Armed Forces Qualification Test (AFQT) and the Enlistment Screening Test (EST) and supplementary screening measures for more specific aptitudes, the Army Qualification Battery (AQB); and tests for women applicants, the Armed Forces Women's Screening Test (AFWST), Women's Enlistment Screening Test (WEST), and Women's Army Classification Battery (WACB). With the introduction of a number of new and replacement tests during FY 1962-63, task activity turned to new approaches to screening problems and to contributions of screening activities to classification and other manpower management functions. Research plans were formulated to study seasonal and regional fluctuations in AFQT score distributions, the aptitude composition of the civilian manpower pool, new approaches to the detection of deliberate failures, feasibility of shortened screening tests, and practicability of automated testing. (Author)

HERALD OF THE SCHOOLS OF HIGHER EDUCATION, 1964, VOL. 22, NO. 1,
28 May 64, 218p
FTD TT64,-136; TT 64 71122

Unclassified report

Unedited rough draft trans. of Vestnik Vysshei Shkoly (USSR) 1964 [v. 22] no. 1, p. 1-96.

Descriptors: (*Education, USSR), Universities, Communists, Agriculture, Forestry, Social sciences, Chemistry, Engineering, Construction, Economics, Electronics, Language, Communism, Bionics, Cybernetics, Teaching machines, Scientific personnel, History, Reports.

Reports by Soviet university professors are compiled. The curricula and instruction methods of higher education in the USSR are discussed in relation to Communist philosophy.

AD-602 696 Div. 23, 8
OTS Prices: HC $2.00/MF $0.50

Bureau of Naval Personnel, Washington, D. C.
SYSTEMATIC TROUBLESHOOTING ANSWER SHEETS.
31 May 64, 50p
NAVPERS 92900ANS

Unclassified report

Descriptors: (*Instruction manuals, Electronic equipment), Reports, Guided missile personnel, Naval personnel, Technicians, Training, Maintenance, Guided missiles (Underwater-to-surface).

Answer sheets for training manual, 'Systematic Troubleshooting' (AD-602 697).

AD-602 697 Div. 23, 8
OTS Prices: HC $3.00/MF $0.75

Bureau of Naval Personnel, Washington, D. C.
SYSTEMATIC TROUBLESHOOTING.
Training manual.
31 May 64, 64p
NAVPERS 92900

Unclassified report

Descriptors: (*Instruction manuals, Electronic equipment), Guided missile personnel, Naval personnel, Technicians, Training, Maintenance, Guided missiles (Underwater-to-surface).

The training manual in systematic electronic troubleshooting is approved for use in basic electronics instruction for Polaris Weapons System technicians. It is written in programed format for the trainee's use as a self-administered study aid supplementing formal classroom instruction in Class 'A' school. NAVPERS 92900-ANS (AD-602 696), 'Systematic Troubleshooting Answer Sheets', is promulgated for use in conjunction with this manual. (Author)

AD-602 821 Div. 23, 28
OTS Prices: HC $5.00/MF $1.00

Case Inst. of Tech., Cleveland, Ohio.
PERSONNEL EVALUATION AND OPTIMAL ASSIGNMENT,
by William R. King. Apr 64, 182p
Contract Nonr1141 11

Unclassified report

Descriptors: (*Personnel management, Mathematical models), (*Decision theory, Personnel management), Performance (Human), Psychometrics, Performance tests, Aptitude tests, Decision making, Classification Effectiveness, Mathematical prediction, Operations research, Optimization, Game theory.

The decision-problem involving the assignment of individuals or groups to tasks or limited areas of responsibility within an organization is considered in two interrelated phases -- performance prediction and assignment. Models are developed for making optimal personnel assignments for a variety of cases which include both qualitative and quantitative performance predictions treated as subject to error and errorless. Information levels for the performance measures and relative values which are utilized are investigated to insure that the two phases of the problem may be efficiently combined. (Author)

AD-602 980 Div. 23, 28
OTS Prices: HC $3.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
JOB PERFORMANCE OF EM SCORING LOW ON AFQT.
by William H. Helme and Alan A. Anderson.
May 64, 57p
Proj. 2J024701A722
APRO TRN146

Unclassified report

Rept. on new classification techniques.

Descriptors: (*Performance tests, Army personnel), (*Aptitude tests, Personnel management), (*Psychometrics, Job analysis), Performance (Human), Standards, Military requirements.

To assess the usefulness to the Army of men of lower than average general ability, 1000 enlistees accepted by the army when qualifications were temporarily lowered were followed up 12 to 18 months later to obtain job performance ratings and disciplinary records. Of RA Category IV men (10th - 30th percentile on AFQT) in combat MOS, 50% were rated as performing acceptably, 43% as meeting standards of Army career performance. Corresponding percentages in technical MOS were 45% and 40%. Note that most of these men were in low skill MOS, and that findings on level of performance apply only within such MOS. Successful performance depended to some extent on a man's having his highest skills in the aptitude area of the MOS in which he was serving. In this selected group, no clear evidence was found that more refined screening on age, education, and cognitive tests would result in appreciable gain in differential classification. (Author)

AD-602 981 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
METHODS FOR IMPROVING ENLISTED INPUT,
by A. G. Bayroff. May 64, 18p
Proj. 1J024701A722
APRO TRR1136

Unclassified report

Rept. on input quality.

Descriptors: (*Psychometrics, Personnel management), (*Aptitude tests, Army personnel), (*Personnel management, Psychometrics), Training, Standards, Military requirements, Job analysis, Test construction (Psychology).

25. Physics

AD-602 310 Div. 25, 15
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE UNPERTURBABILITY OF A SPHERICAL PENDULUM OF VARIABLE LENGTH WITH MOTION OF THE FULCRUM IN A CENTRAL GRAVITATIONAL FIELD; DETERMINATIONS OF CONSTRAINTS IN A SYSTEM OF RIGID BODIES; APPROXIMATE DESIGN OF PROTECTIVE METEOR SHIELDS,
by M. Z. Litvin, A. I. Lur'e, L. S. Bezgin, and M. I. Ivashchenko. 16 Jun 64, 36p
FTD TT64 413; TT 64 11845

Unclassified report

Unedited rough draft trans. of A[kademiya] N[auk] USSR, Otdelenie Tekhnicheskikh Nauk. Izvestiya: Mekhanika Mashinostroenie, 1963, no. 1, p. 33-46.

Descriptors: (*Gyroscopes, Mechanics), (*Motion, Mathematical analysis), (*Armor plate, Meteors), Gravity, Perturbation theory, Equations, Design, Thickness, USSR.

For a definite class of translations of the fulcrum, nonperturbability is obtained with a pendulum of variable length being based on the fact that for a definite law of variation of the pendulum length the force of inertia of the pendulum, stipulated by its rotational acceleration, counteracts the perturbing translational force of inertia of the pendulum. (Litvin) A mathematical determination was made of constraints in a system of rigid bodies. (Lur'ye) Account is given of a method for approximate design of a meteor shield based on the fact that when a meteor impacts a wall both the wall and the meteor itself are vaporized. Numerical examples are given. (Bezgin and Ivashchenko)

AD-602 311 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IDENTITY PERIOD OF THE LATTICE AND MICROHARDNESS OF SOLID SOLUTIONS OF INDIUM AND GALLIUM PHOSPHIDES,
by N. N. Sirota and V. V. Rosov. 11 Jun 64, 8p
FTD TT64 151; TT 64 11846

Unclassified report

Unedited rough draft trans. of A[kademiya] N[avuk] BSSR Minsk. Doklady, 1963, v. 7, no. 7, p. 446-448.

Descriptors: (*Semiconductors, Solid solutions), (*Solid solutions, Semiconductors), (*Gallium alloys, Phosphorus alloys), (*Indium alloys, Phosphorus alloys), Synthesis (Chemistry), Crystal lattices, Hardness, Metallurgical analysis, Radiography, X-ray diffraction analysis, USSR.

The purpose of the investigation was to clear up the matter of the existence of solid solutions in the quasi-binary system InP--GaP and the determination of the period of the identity of the crystalline lattice. The synthesis of the compounds InP and GaP and their solid solutions was accomplished by the method of saturation with phosphorus from the vapor phase fusions of indium and gallium of given compositions. The alloys obtained were subjected to metallographic and radiographic analyses and their microhardness was measured. The results yielded convincing evidence of the fact that, at least in the area of high temperatures, there exists a continuous series of solid solutions of InP and GaP with which the constant of the lattice changes practically additively with the concentration of GaP.

AD-602 315 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PRODUCTION AND DIELECTRIC PROPERTIES OF SINGLE CRYSTALS OF SOLID SOLUTIONS OF Pb(TiO3-ZrO3), LEAD METANIOBATE, AND CRYSTALS OF SOLID SOLUTIONS OF LEAD METANIOBATE AND LEAD TITANATE,
by A. L. Khodakov and M. L. Sholokhovich. 28 May 64, 14p
FTD TT64 320; TT 64 11850

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Fizika (USSR) 1961, no. 2, p. 85-91.

Descriptors: (*Ferromagnetic materials, Lead compounds), (*Lead compounds, Ferromagnetism), Single crystals, Production, Crystal growth, Solid solutions, Dielectric properties, Niobates, Titanates, Zirconates, Phase studies, Electrical conductance, Semiconductors, Antiferromagnetism, USSR.

The work describes the production and dielectric properties of solid solution single crystals of lead metatitanate and lead metazirconate, single crystals of lead metaniobate and of its solid solutions with lead titanate. It was established that the conductivity of Pb(ti - Zr)O3 crystals strongly increases as temperature rises. Small additions of PbZrO3 did not substantially affect the dielectric properties of solid solutions. Studying the dielectric properties of PbNb2O6 crystals permitted the establishment of the conditions for converting them from a nonferroelectric to a ferroelectric modification. (Author)

AD-602 323 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
CLASSIFICATION OF MEDIA,
by Paul Rolland. May 64, 18p D1 82 0347

Unclassified report

Also available from the author.

Descriptors: (*Perturbation theory, Mathematical analysis), (*Boundary value problems), Integral equations, Fourier analysis, Theory, Stability, Plasma physics.

The paper presents remarks about and supplements to Polovin's paper on Sturrock's theory of growing waves. The paper of Polovin does not clarify all the difficulties in the theory of Sturrock. With these remarks and supplements, a complete connection is established between the theory of Sturrock and the analytical method developed in this paper. It is shown that for the absolute instability, the demonstration of Polovin has to be completed to avoid an ambiguity. For evanescence, the boundary conditions introduced by Polovin must not be independent, so that some root gives a zero contribution; for absolute instability, it would be impossible to introduce any boundary conditions. (Author)

AD-602 338 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROBLEMS IN HIGH-TEMPERATURE PHYSICS,
by V. A. Kirillin. 14 May 64, 12p
FTD TT64 295, TT 64 11864

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Vestnik, 1963, v. 33, no. 2, p. 38-43.

24. Photography and Other Reproduction Processes

AD-602 625 Div. 24, 18, 25
OTS Prices: HC $4.00/MF $1.00

Itek Corp., Waltham, Mass.
STUDY OF IMAGE-EVALUATION TECHNIQUES.
Interim engineering rept. no. 7, 15 Dec 63-15 Apr 64, by G. C. Brock, R. Barakat, E. B. Kitrosser, R. L. Dussault, and W. L. Attaya. 15 Apr 64, 149p Itek 9048 8
Contract AF33 657 9158

Unclassified report

Descriptors: (*Aerial photography, Simulation), (*Aerial reconnaissance, Mathematical models), (*Photographic techniques, Analysis), Photographic images, Photographic lenses, Photographic emulsions, Photographic film, Optics, Functions, Graphics.

The goal of this image evaluation study is the development of a mathematical model for calculating the performance of reconnaissance systems. An essential foundation for this effort is the ability to measure or calculate the physical characteristics of lenses, emulsions, and other components of these systems with the requisite accuracy. Interim Engineering Report (AD-600 950) described progress made with the Itek Image Analyzer Unit (Model II) used for measuring the transfer functions of lenses. This report presents calculations of the line spread function and edge spread function as derived from the transfer function; the axial image is considered in the presence of various degrees of third-order spherical aberration and defocusing. A simplified graphical method for deriving single-bar response from the edge spread function is described. Experimental work is recorded on the measurement of lens-film transfer functions, in which both sinusoidal targets and edges are used, with SO-243 emulsion. The mathematical basis for the transform program currently used with Itek's CDC-924 computer when deriving transfer functions from edge traces is described. Finally, an account of continued work on the coherent light method for measuring emulsion transfer functions is presented.

AD-602 853 Div. 24, 2
OTS Prices: HC $3.00/MF $0.75

Itek Corp., Waltham, Mass.
STUDY OF IMAGE-EVALUATION TECHNIQUES.
Interim engineering rept. no. 8, 15 Apr-15 Jul 64, by W. L. Attaya, R. Barakat, R. R. Shannon and P. Nisenson. 15 Jul 1964 65p Itek 9048 9
Contract AF33 657 9158

Unclassified report

Descriptors: (*Aerial reconnaissance, Mathematical models), (*Mathematical models, Aerial reconnaissance), (*Aerial photography, Photographic connaissance), Aerial photographs, Photographic images, Photointerpretation, Photometers, Optical phenomena, Functions.

The goal of this image evaluation study is the development of a mathematical model for calculating the performance of reconnaissance systems. Essential to this effort is the ability to measure or calculate the physical characteristics of lenses, emulsions, and other components of these systems with requisite accuracy. Therefore, along with the mathematical development of the model, a major part of the activity lies in the development of precise experimental and analytical techniques suitable for carrying out the required measurements and calculations. These techniques are discussed. The computational developments which make use of lens design data and predetermined transfer functions are discussed.

AD-602 961 Div. 24, 6, 22
OTS Prices: HC $7.00/MF $1.75

Perkin-Elmer Corp., Norwalk, Conn.
LONG FOCAL LENGTH BALLISTIC CAMERA STUDY.
Final rept.
2 Oct 61, 386p PE 5942
Contract AF08 606 4338
AFMTC TR61 24

Unclassified report

Descriptors: (*Ballistic cameras, Feasibility studies), Cameras, Camera components and accessories, Design, Operation, Optimization, Photometers, Photographic images, Optics, Atmospheric refraction, Tracking, Calibration, Data, Reduction, Supports, Timing devices, Specifications.

This study was conducted for the purpose of investigating the technical feasibility of attaining angular accuracies approaching 0.5 second of arc while covering an area of approximately 10 degrees x 60 degrees with a 1200 mm ballistic camera. A complete study of all major aspects of a practical ballistic camera system is presented, namely, photometry, seeing, tracking techniques, orientation calibration, data reduction, mount configuration, timing requirements, shutters, atmospheric refraction, error sources and operational considerations. A preliminary design specification for this system is provided.

Unedited rough draft trans. of Zhurnal Tekhnicheskoi Fiziki (USSR) 1963, v. 33, no. 12, p. 1444-1448.

Descriptors: (*Ion beams, Focusing), (*Ion sources, Plasma physics), Ions, Nitrogen, Fluorine, Electric discharges, Electric arcs, Electrodes, Voltage, Optimization, Spectroscopy, Electromagnetic lenses, USSR.

A report is given on the effective use of plasma focusing when selecting ions from a pulse source of multiply charged ions (pulse length 200 micro sec., repetition rate 2 cps). Gaseous nitrogen was admitted into the source. With optimum selection of the parameters of discharge in the source, potential of the extracting electrode and the geometry of the source gap, the extracting electrode received a 300 ma pulse current of heavy ions accelerated to 35 kv. Half of this current consists of nitrogen ions, the balance of ions of elements making up the material from which the ion source is constructed. The presence of N(+3) - 17 ma, N(+2) - 54 ma, N(+) - 42 ma, F(+2) - 30 ma, F(+2) - 20 ma etc. ions was established in the spectrum. (Author)

AD-602 374 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STUDY OF HEAT EMISSION DURING THE CONDENSATION OF MOVING STEAM IN A HORIZONTAL PIPE,
by L. D. Berman and Yu. A. Tumanov. 5 May 64, 22p
FTD TT64 301; TT 64 11882

Unclassified report

Unedited rough draft trans. of Teploenergetika (USSR) 1962, v. 9, no. 10, p. 77-83.

Descriptors: (*Thermal radiation, Steam), (*Heat transfer, Condensation), Gas flow, Heat, Velocity, Pipes, Steam pipes, Thermodynamics, USSR.

The results are presented of experimental research of the condensation of moving steam along a horizontal pipe placed in a cluster.

AD-602 380 Div. 25
OTS Prices: HC $6.00/MF $1.50

Brandeis Univ., Waltham, Mass.
PHOTOIONIZATION, ELECTRON-TRAPPING AND PHOTOCONDUCTION IN GLASSES.
Final rept.,
by Henry Linschitz and Richard A. Hebert. 2 Apr 64, 268p
Contract AF19 604 4536, Proj. 5620, Task 56206
AFCRL 64 298

Unclassified report

Descriptors: (*Photoconductivity, Glass), (*Electron capture, Glass), (*Glass, Photoelectric effect), Ionization, Electrodes, Spectrophotometers, Conductivity, Naphthacenes, Electrons, Photoelectrons, Ionization potential, Absorption spectrum, Quantum statistics, Platinum, Stainless steel, Capacitance, Aromatic compounds, Sensitivity, Intensity.

Photoionization and electron-trapping in glassy media, using spectrophotometric and conductimetric techniques is described. Aromatic anions (mono- and di-negative ions of naphthacene) were selected as the systems for study because of their low ionization potentials, slow back reactions and known spectra of the ions and parent hydrocarbons. The glassy solvent was 2-methyltetrahydrofuran (2-MTHF) at liquid N2 temperature. Using chemical actinometry, quantum yields for the overall photoionization and electron-trapping process were measured for both naphthacene ions. A new effect was observed, in which the photothreshold of platinum or stainless steel electrodes was shifted from below 2600 A to about 5000 A, as a result of contact with naphthacene dianion. The observed phenomena, including effects of intensity, exposure time, photovoltaic behavior and 'reversed' photocurrents, can be consistently interpreted on the basis of simultaneous electrode and volume ionization processes, combined with space-charge effects. These latter complications arise from the differential rates of diffusion of negative and positive carriers, and from finite electron-trapping energies.

AD-602 404 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE COLLISION OF TWO PLATES WITH GREAT SPEED [AND] AN APPRAISAL OF THE ROLE OF RADIATION WHEN CALCULATING HEAT EXCHANGE IN A TURBULENT BOUNDARY LAYER.
by E. I. Andryankin, S. S. Kutateladze, A. I. Leont'ev and N. A. Rubtsov. 17 Jun 64 23p
FTD MT63 262; TT 64 11892

Unclassified report

Edited machine trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) 1963, no. 4, p. 68-73, 88-93.

Descriptors: (*Impact shock, Shock waves), (*Heat transfer, Thermal radiation), (*Turbulent boundary layer, Heat transfer), Gases, Scattering, Flat plate models, Thickness, Density, Meteorites, Boundary layer, Friction, Polynomials, Integral equations, USSR.

In the first paper, consideration is given to the problem of the scattering of gases formed by the impact of colliding plates in a vacuum. In the second paper, the relative ultimate laws of heat exchange and friction are employed in an appraisal of the role of radiation during the calculation of heat exchange in a high-temperature compressible turbulent boundary layer.

AD-602 406 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT OPTIMUM DROPPING OF LOAD,
by O. M. Golubentsev and V. D. Novikov. 16 Jun 64 12p
FTD TT64 222; TT 64 11894

Unclassified report

Unedited rough draft trans. of Prykladna Mekhanika (USSR) 1964, v. 10, no. 1, p. 24-31.

Descriptors: (*Machines, Loading (Mechanics)), (*Control systems, Machines), Optimization, Oscillation, Elasticity, Differential equations, Inequalities, Functions, USSR.

AD-602 410 Div. 25
OTS Prices: HC $4.00/MF $0.75

Paris Univ. (France).
ON THE COLLECTIVE DESCRIPTION OF CLASSICAL PLASMAS.
Technical note no. 1,
by G. Kalman. Apr 64, 108p LP36
Contract AF61 052 613
ARL 64 140

Unclassified report

Descriptors: (*Plasma physics, Mathematical models), Particle trajectories, Momentum, Magnetic fields, Statics, Plasma oscillations, Dielectric properties, Transformations (Mathematics), Hamiltonian, Integral transforms, Tensor analysis, France.

Descriptors: (*High temperature research, Reviews), Heat transfer, Liquid metals, Vapors, Gases, Heat-resistant materials, Thermodynamics, Research program administration, USSR.

Four basic directions in high-temperature heat physics are discussed. These are the investigations of thermophysical properties of heat transmission and physicochemical processes in liquid metals and their vapors, investigations of thermophysical properties and heat transmission in gases at high temperatures, investigations of thermophysical properties of heat emisission and physico-chemical processes in construction materials at high temperatures, and investigations of thermophysical processes in high-temperature constructions and apparatuses.

AD-602 343 Div. 25, 7, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BEHAVIOR OF CATHODE SPOTS IN A HIGH-CURRENT ELECTRIC DISCHARGE,
by V. Grakov and V. Hermoch. 28 May 64, 18p
FTD TT64 152; TT 64 11869

Unclassified report

Unedited rough draft trans. of Chekhoslovatskii Fizicheskii Zhurnal (USSR) 1963, v. 13, no. 7, p. 509-517.

Descriptors: (*Electric discharges, Cathodes), (*Cathodes, Electric discharges), Electrodes, Metals, Surface properties, Electrons, Thermionic emission, Erosion, Test methods, Capacitors, Electric arcs, Barometric pressure, Optical properties, Photographic analysis, USSR.

Investigation of a high-current single discharge at atmospheric pressure revealed the existence of cathode spots of two types. Spots of the first type, characterized by a high rate of motion toward fresh sections of the electrode, evidently form on all metals. If an autoelectronic mechanism of emission from a cathode is assumed, then the characteristics of their behavior can be explained by the fact that when the surface irregularities of the metal are fused and its crystalline structure is disrupted by bombardment of positive ions, electron emission within the spot decreases. Spots of the second type have low mobility and form only on metals with low values of thermophysical constants in places of local cathode boiling. Their formation is connected to the increased concentration of metallic vapor under the boiling surface making the ionizing action of the primary electrons more effective. The attachment of these spots to the vaporization centers, which follows from this, causes their low mobility.

AD-602 349 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ENERGY SPECTRA OF IONS SCATTERED BY POLY-CRYSTALLINE SURFACES OVER SMALL ANGLES,
by V. A. Molchanov and V. Soshka. 18 Jun 64, 6p
FTD TT64 543; TT 64 11875

Unclassified report

Unedited rough draft trans. of A[kademiya] N[auk] SSSR. Doklady, 1964, v. 155, no. 1, p. 70-71.

Descriptors: (*Ion beams, Scattering), Ions, Argon, Energy, Distribution, Particle accelerator targets, Copper, Graphite, Crystals, Surfaces, Spectroscopy, USSR.

A study was made of the dependency of energy spectra on scattering angle for the case of 25-Kev argon ions scattered by copper and graphite targets. The results confirm the essential role of multiple scattering even for angles of incidence close to the glancing angle.

AD-602 359 Div. 25
OTS Prices: HC $4.00/MF $0.75

Massachusetts Inst. of Tech., Cambridge.
SOLID-STATE AND MOLECULAR THEORY GROUP,
Quarterly progress rept. no. 53.
15 Jul 64, 122p
Contracts Nonr1841 34, AF19 628 356

Unclassified report

Descriptors: (*Solid-state physics, Scientific research), Molecular properties, Crystals, Crystal structure, Atomic energy levels, Metallic crystals, Lithium, Sodium, Diamonds, Potassium compounds, Chlorides, Rare earths, Ions, Molecular association, Atomic orbitals, Magnetic fields.

Contents: Space groups and wave function symmetry in crystals; Energy bands of the alkali metals. I. Lithium and sodium; Preliminary energy bands for diamond; Calculation of a one-electron crystal potential and application of potassium chloride; Quadrupole anti-shielding factors for rare-earth and some other heavy ions; 3d Ion covalency; Magnetic breakdown and ultrasonic attenuation in a two-dimensional model.

AD-602 368 Div. 25, 13
OTS Prices: HC $1.00/MF $0.50

Massa Div., Cohu Electronics, Inc., Hingham, Mass.
PERFORMANCE OF UNDERWATER HORNS,
by Frank Massa, Jr. 15 Jun 64, 24p Massa ER6415
Contract Nonr4392 00X

Unclassified report

Descriptors: (*Acoustic horns, Underwater sound equipment), (*Acoustic impedance, Measurement), Transducers, Accelerometers, Underwater sound, Frequency, Structures, Concrete, Steel, Vibration, Design, Performance (Engineering).

The report presents the results of tests showing the performance of several types of experimental underwater horns, especially in regard to their effectiveness in increasing the radiation resistance loading on a vibrating transducer whose dimensions are small compared to the wavelength of the radiated sound. An NRL 2 kc transducer having a 5 in x 5 in radiating face was used as the driver and all the horns are of the same dimensions and shape except for the variations in their wall construction. Three steel horns were built in accordance with the requirements of the contract. In addition, a concrete horn structure was built outside the scope of the contract which incorporates proprietary ideas of a horn construction previously proposed for underwater applications. An experimental concrete structure also was built.

AD-602 373 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SELECTION AND PRIMARY FOCUSING OF IONS IN A SOURCE OF MULTIDISCHARGE IONS
by F. I. Mineev and O. F. Kovpik. 18 Jun 64, 12p
FTD TT64 541; TT 64 11881

Unclassified report

AD-602 438 Div. 25, 14
OTS Prices: HC $5.00/MF $1.00

General Electric Co., Schenectady, N. Y.
RESEARCH OF DIELECTRIC MATERIALS.
Rept. for 15 Jan 63-15 Jan 64,
by J. C. Devins, H. L. Greenhaus, R. J. Wolff, D. R. Johnston, and F. F. Carini. May 64, 1159p
Contract AF33 657 8825, Proj. 7371, Task 737101
ML TDR64 57

Unclassified report

Descriptors: (*Dielectrics, Scientific research), Gas ionization, Electrons, Attachment, Mass spectroscopy, Gases, Polyatomic molecules, Fluorocarbons, Electric corona, Degradation, Electric discharges, Damage, Electric insulation, Dielectric films, Chemical reactions, Electron bombardment, Ion bombardment.

Phase I of this work was concerned with electron impact ionization and attachment in polyatomic gases. These processes were examined using a mass spectrometer operating with a retarding potential difference electron source. Ionization and attachment coefficients were measured using an electron swarm or Townsend technique. Results were obtained principally with perfluorocarbon gases, many of which are of interest for use as high dielectric strength gases. In Phase II, studies of the chemical degradation of materials under the action of corona were continued. Along with continuing the studies on weight loss in Mylar, similar investigations were made on 'H' film at the request of AF Materials Laboratory, Research and Technology Division. The chemical effects of different types of corona discharges, distinguished earlier, were studied on model compounds. By the use of d-c voltages it was possible to compare damage caused by positive ion and electron bombardment. (Author)

AD-602 439 Div. 25
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Schenectady, N. Y.
RESEARCH AND DEVELOPMENT TO INVESTIGATE THE MICROSTRUCTURE OF THE INTERNAL MAGNETIC FIELD IN FERRO-, FERRI-, AND ANTIFERROMAGNETIC SOLIDS.
Final rept. for 1 Feb 63-31 Jan 64,
by D. S. Rodbell, T. W. Moore, P. E. Lawrence and I. S. Jacobs. Apr 64, 38p
Contract AF33 657 8462, Proj. 7371, Task 737103
ML TDR64 58

Unclassified report

Descriptors: (*Ferromagnetic materials, Microstructure), (*Antiferromagnetism, Magnetic fields), Gadolinium, Single crystals, Magnetic resonance, Molecular properties, Magnetostriction, Crystal lattices, Iron compounds, Bromides, Carbonates, Cobalt compounds, Chlorides.

Single crystals of gadolinium metal were studied by the separate techniques of high field magnetization and ferromagnetic resonance. The former showed the adequacy of a molecular field model description while the latter uncovered a significant change in g-factor at the ordering temperature. The consequences of the presence of a biquadratic exchange term in addition to the usual bilinear one and of the formally related exchange-striction were examined. Attention was focused upon modifications to molecular field model predictions and functional relations were found for hitherto-unexplained magnetic behaviors that occur very widely in nature. Research into the antiferromagnetism of a number of layer-like compounds was undertaken with the general goal of evaluating exchange interactions from their behavior in high magnetic fields. Apart from the explorations of metamagnetic behavior, two new phenomena were observed: the presence of Van Vleck type paramagnetic susceptibility in fields higher than those required for 'ordinary' saturation of the antiferromagnetic system, and a nonlinear (concave upwards) low-temperature transverse magnetization curve below saturation. (Author)

AD-602 452 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Electron Physics Lab., Univ. of Michigan, Ann Arbor.
NONLINEAR BEAM-PLASMA INTERACTIONS.
Technical rept. no. 69,
by J. E. Rowe. Mar 64, 78p ORA 05000 12T
Contract AF33 657 8050, Projs. 05000, 4156, Task 415603

Unclassified report

Descriptors: (*Electron beams, Plasma physics), (*Plasma medium, Electron beams), Nonlinear systems, Electromagnetic waves, Propagation, Particle trajectories, Statistical functions, Integration, Traveling wave tubes.

The nonlinear interaction phenomenon involving a beam-plasma-electromagnetic wave combination is investigated using a Lagrangian method to calculate particle trajectories and energy conversion. Although collision effects are neglected finite temperature streams are treated by assigning appropriate particle distribution functions in velocity-phase space. Numerical calculations are presented for multiple stream and beam-plasma configurations with and without propagating slow electromagnetic waves. (Author)

AD-602 463 Div. 25
OTS Prices: HC $2.00/MF $0.50

Istituto Universitario Navale, Naples (Italy).
SCATTERING FROM PLANE INFINITE INHOMOGENEOUS LAYERS.
Technical note no. 3,
by Giorgio Franceschetti. 15 Sep 63, 36p
Contract AF61 052 589

Unclassified report

Descriptors: (*Electromagnetic waves, Scattering), Impedance matching, Electromagnetic wave reflections, Propagation, Numerical analysis, Differential equations, Vector analysis, Matrix algebra, Italy.

The problem of scattering from plane infinite, inhomogeneous layers, arbitrarly terminated, under normal or oblique incidence, was studied. It is shown that the problem can always be solved via a Riccati differential equation. This equation is studied and approximately solved in two limiting cases (slow varying media, and quasi-static case). The solutions are widely discussed. (Author)

AD-602-465 Div. 25, 20
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
MAGNETIC PROPERTIES USING THE MOSSBAUER EFFECT.
Summary rept. no. 1, 1 May 62-30 Apr 63,
by P. Hillman. 30 Apr 63, 23p
Contract AF61 052 621

Unclassified report

Descriptors: (*Ferromagnetic materials, Mossbauer effect), (*Krypton, Complex compounds), (*Mossbauer effect, Magnetic properties), Ferrites, Magnetite, Paramagnetic materials, Crystal structure, Barium compounds, Iron compounds, Oxides, Crystal lattice defects, Line spectrum, Temperature control, Nuclear reactors, High-temperature research, ISRAEL.

Topics include: the Curie temperature of alpha-ferric oxide; the nature and the high-temperature behavior of FeO; barium ferrite; superparamagnetism; krypton and the clathrates.

Collective coordinates are considered as a linear transformation of deviations from the unperturbed orbit. In general they are admixtures of particle coordinates and of particle momenta. On this basis a reformulation and generalization of the Bohm-Pines theory and a classical equivalent of Brout's method is introduced. The correspondence of the two treatments is demonstrated. The method developed is employed to establish a collective description of magnetostatic interaction. A Hamiltonian describing magnetic interaction in terms of particle variables is derived. This serves as a starting point. The Fourier transform of the momentum density appears as a collective coordinate. Subsequent canonical transformations lead to a collective fluid-like description, to an extended Hamiltonian with coupling and to dressed uncoupled collective variables. A new collective mode with two transverse polarizations emerges; it exhibits an unstable behaviour and prevails in the case of unisotropic velocity distribution only. In general it is coupled to the plasma oscillation mode. Finally the dielectric description of a system with unisotropic temperature-tensor is presented. (Author)

AD-602 420 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
PHENOMENOLOGICAL THEORY OF MULTI-MODE SURFACE WAVE EXCITATION, PROPAGATION AND DIFFRACTION. I. PLANE STRUCTURES.
Research rept.
by Samuel N. Karp and Frank C. Karal, Jr. Apr 64, 33p
EM-198
Contract AF19 628 3868, Proj. 5635, Task 563503
AFCRL 64 332

Unclassified report

Descriptors: (*Electromagnetic fields, Theory), Electromagnetic waves, Wave transmission, Propagation, Scattering, Electrical impedance, Electromagnetism, Boundary value problems, Vector analysis, Dielectrics, Waveguides.

The purpose of this paper was to study the electromagnetic field that arises when a magnetic line dipole source is located above a plane structure that supports several surface waves if the surface of the structure is characterized by a generalized impedance boundary condition. This condition is introduced here for the first time. An exact solution is given for plane structures supporting one, two and three surface waves. The magnitudes of the surface waves and simple formulas for the radiated far field patterns are given. It is shown how the methods employed in the paper can be extended to the case of plane structures that support any number of surface waves.

AD-602 424 Div. 25
OTS Prices: HC $1.00/MF $0.50

AVCO Everett Research Lab., Everett, Mass.
AN EXPERIMENTAL MEASUREMENT OF THE DEPENDENCE OF THE H-I CURVE OF NB-ZR WIRE ON TEMPERATURE,
by R. D. Cummings and W. N. Latham. Jul 64, 10p
AMP-141
Contract AF04 694 414
BSD TDR64 87

Unclassified report

Descriptors: (*Superconductors, Niobium alloys), (*Niobium alloys, Zirconium alloys), Wire, Superconductivity, Measurement, Test equipment, Magnetic fields, Electric currents, Temperature, Cryogenics.

The report contains the description of an apparatus to measure the variation with temperature of the current carrying capacity of short samples of superconducting material as a function of externally applied magnetic field. Included in the report are data for the following samples: Nb-25% Zr - 0.010 in. dia. wire; Nb-25% Zr - 0.010 in. dia. wire (heat treated); Nb-33% Zr - 0.010 in. dia. wire. (Author)

AD-602 435 Div. 25, 20
OTS Prices: HC $3.00/MF $0.75

Research Lab. of Electronics, Mass Inst. of Tech, Cambridge.
ELECTROMAGNETIC INDUCTION ON AN EXPANDING CONDUCTING SPHERE,
by Luiz C. Bahiana. 30 May 64, 78p RLE 421
Contract DA36 039AMC03200E; Grant DA SIG36 039 61G14

Unclassified report

This report is based on a thesis submitted to the Department of Electrical Engineering, M. I. T., 15 May 62.

Descriptors: (*Spheres, Electromagnetic fields), (*Electromagnetism, Spheres), Inductance, Electrical conductance, Magnetic fields, Numerical analysis, Partial differential equations, Integral equations, Vector analysis, Differential geometry, Nuclear explosions, Electric fields.

This report concerns a theoretical investigation of the electromagnetic fields associated with the radial expansion of a spherical conductor immersed in an originally uniform, static, magnetic field. Radial expansion, as used here, implies an increase in size without change of geometrical shape. The conducting sphere of initial radius a sub o in a static magnetic field which, in the absence of the sphere, is uniform. At a certain time (t=0) the sphere begins to expand. The radius of the sphere is a prescribed arbitrary function of time, a(t). Since the sphere is electrically conducting, its interaction with the magnetic field as it expands results in the induction of currents that, to a greater or lesser extent, shield the magnetic field from the interior of the sphere. The determination of the fields generated by these currents is the objective of this research. In general, it is necessary to prescribe not only the time dependence of the radius but also the velocity as a function of space and time for all points inside the sphere. The forces that are necessary to cause the expansion are assumed to exist, but are not prescribed. Once the fields and currents are found, these forces can be determined. The cases of perfect and imperfect conductivity will be investigated. (Author)

AD-602 437 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Airborne Instruments Lab., Inc., Deer Park, N. Y.
STUDY OF SOLID-STATE AND TRAVELING-WAVE MASER TECHNIQUES.
Quarterly progress rept. no. 3,
by J. A. DeGruyl, W. W. Heinz, S. Okwit and J. G. Smith.
Jun 64, 14p
Contract AF30 602 2989, Proj. 4506, Task 450602
RADC TDR64 226

Unclassified report

Descriptors: (*Masers, Broadband), Traveling wave tubes, Solid state physics, Bandwidth, Feasibility studies, Microwave amplifiers, Limiters, Temperature, Gain, Magnetic fields.

The purpose of this program was to develop improved maser techniques and apply them to an operable breadboard maser system. Improved techniques for obtaining the required field gradients were developed and instantaneous bandwidths greater than 300 Mc were obtained using them. In addition, the feasibility of obtaining 500-Mc instantaneous bandwidths was shown. (Author)

interactions in magnetic crystals on external parameters such as electric and magnetic fields and stress is studied. It is shown how from the knowledge of the site symmetry, predictions can be made on the properties of this dependence. The case of the fluorine site in MnF2 is described as an illustrative example. (Author)

AD-602 479 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
ELECTRICAL RESISTIVITY OF NAPHTHALENE, PHENANTHRENE AND GLUCOSE,
by R. W. Warfield. 13 May 64, 11p
Proj. N10a1 56
NOL TR63 75

Unclassified report

Descriptors: (*Naphthalenes, Resistance (Electrical)), (*Phenanthrenes, Resistance (Electrical)), (*Glucose, Resistance (Electrical)), Semiconductors, Organic Materials, Models (Simulations), Crystallization, Dynamics, Glass.

The electrical volume resistivity of naphthalene, phenanthrene and glucose was determined in the region of the melting point and, in the case of glucose, in the glass transition region. Both naphthalene and phenanthrene exhibit abrupt increases in the magnitude of the resistivity upon solidification and crystallization from the melt. This change in magnitude and the subsequent increase in the temperature dependence of the resistivity is attributed to the sudden formation of a polycrystalline solid. Glucose, on the other hand, which is an amorphous solid, exhibits no such abrupt increases. However, differences in the temperature dependence of the resistivity of glucose are found in the glass transition region. These differences are discussed. The results of the investigation show that electrical volume resistivity techniques are suitable for investigating the kinetics of crystallization of semiconductors. (Author)

AD-602 488 Div. 25
OTS Prices: HC $2.00/MF $0.50

Florida Univ., Gainesville. Engineering Experiment Station.
RANDOM VIBRATIONS OF NONLINEAR ELASTIC STRUCTURES,
by Richard E. Herbert. May 64, 37p
Grant AF AFOSR62 313, Proj. 9782, Task 37718
AFOSR 64 0887

Unclassified report

Descriptors: (*Beams (Structural), Vibration), (*Metal plates, Vibration), Structures, Elasticity, Oscillation, Nonlinear systems, Excitation, Noise, Probability, Statistical functions.

The theory of the Markoff process and the associated Fokker-Planck equation is used to investigate the large vibrations of beams and plates with arbitrary boundary conditions subjected to white noise excitation. An expression for the joint probability density function of the first N coefficients of series expansions of the middle surface displacements is obtained. Detailed calculations presented for simply supported beams and plates show that the probability density function of the modal amplitudes are non-Gaussian and statistically dependent. Numerical computations for the plate indicate a significant reduction of the mean squared displacement for values of the parameters well inside the range of practical considerations. Furthermore, for smaller aspect ratios the per cent reguction is greater. (Author)

AD-602 489 Div. 25
OTS Prices: HC $1.00/MF $0.50

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDY OF ADSORPTION OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE.
Scientific rept. no. 7,
by J. V. Florio. 30 Apr 64, 14p TR64 255 7
Contract AF19 628 331, Proj. 5634, Task 563405
AFCRL 64 468

Unclassified report

Descriptors: (*Tungsten, Surface properties), (*Molybdenum, Surface properties), (*Nitrogen, Adsorption), (*Carbon compounds, Adsorption), Gases, Monoxides, Solids, Wire, Work functions, Vacuum systems.

Measurements of the adsorption of nitrogen on a polycrystalline tungsten wire and of carbon monoxide on molybdenum were continued (see AD-434 094). The saturation coverage of nitrogen on tungsten at room temperature was shown to be a function of the steady-state pressure and varies from 1 x 10 to the 14th power to 2.5 x 10 to the 14th power molecules/sq. cm. over the pressure range 10 to the -9th power to 10 to the -6th power torr. The adsorption of carbon monoxide on molybdenum at room temperature increases the work function of molybdenum over its initial value by 0.1 to 0.2 electron volts at saturation. (Author)

AD-602 490 Div. 25
OTS Prices: HC $1.00/MF $0.50

Midwest Research Inst., Kansas City, Mo.
THE STRUCTURE AND STRENGTH OF EPITAXIAL FILMS.
Bimonthly progress rept. no. 4, 17 Apr-17 Jun 64.
17 Jul 64, 11p
Contract NOw64 006 1d, Proj. 2742P

Unclassified report

Descriptors: (*Films, Epitaxial growth), (*Epitaxial growth, Films), Vacuum apparatus, Stresses, Gold, Electrolytic polishing, Deformation, Failure (Mechanics).

The UHV (ultra-high vacuum) system described in AD-600 149 was modified to develop specimen preparation techniques, and to check out the specimen stressing system. The report consists of a discussion of these three areas of effort and a short summary of work planned for the next report period.

AD-602 493 Div. 25
OTS Prices: HC $5.00/MF $1.00

Osmond Lab., Pennsylvania State Univ., University Park.
RESEARCH IN THE FIELD OF HIGH RESOLUTION INFRARED SPECTROSCOPY.
Final rept.,
by T. K. McCubbin, Jr. 15 Mar 64, 161p
Contract AF19 604 5458, Proj. 8603, Task 860301
AFCRL 64 324

Unclassified report

Descriptors: (*Infrared spectroscopy, Scientific research), Infrared spectrophotometers, Design, Diffraction gratings, Prisms (Optics), Vacuum equipment, Resonance absorption, Nitrogen compounds, Oxides, Isotopes, Molecular properties, Field theory, Atomic energy levels.

Spectroscopic apparatus capable of measuring laboratory absorption spectra at medium infrared wavelengths with a resolution of .08 1/cm and a precision of .005 1/cm was developed. A new double pass system and two prism echelle spectrometers, one a vacuum instrument are described. A computation and quantitative measurement of the radiant power transmitted by the spectrometer was made. These

AD-602 466 Div. 25, 20.
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
ON THE CURIE TEMPERATURE OF ALPHA-Fe2O3.
Technical note no. 3,
by P. Gilad, M. Greenshpan, P. Hillman, and H. Shechter.
20 Nov 63, 6p
Contract AF61 052 621

Unclassified report

Descriptors: (*Iron compounds, Transition temperature), (*Mossbauer effect, Iron compounds), (*Antiferromagnetism, Iron compounds), Measurement, Calibration, Furnaces, Thermocouples, Impurities, Corrections, Dilatometers, Israel.

Conflicting results on the Neel temperature of alpha-Fe2O3 were rechecked and confirmed by means of more accurate instruments. (Author)

AD-602 467 Div. 25, 20
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
MOSSBAUER EFFECT IN Kr83 TRAPPED IN A CLATHRATE COMPOUND.
Technical note no. 2,
by Y. Hazoni, P. Hillman, M. Pasternak and S. Ruby.
24 Sep 62, 10p
Contract AF61 052 621

Unclassified report

In cooperation with the Israel Atomic Energy Commission.

Descriptors: (*Mossbauer effect, Krypton), (*Krypton, Mossbauer effect), Complex compounds, Crystals, Radioactive isotopes, Israel.

The Mossbauer effect was measured for the 9.3 KeV state of Kr83 trapped in a clathrate compound. The existence of the effect for a gas and its unusual temperature dependence may be understood for an atom trapped in a very small cavity. (Author)

AD-602 468 Div. 25, 20
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
THE ANTIFERROMAGNETIC CURIE POINT IN ALPHA-Fe2O3.
Technical note no. 1,
by S. Freier, M. Greenshpan, P. Hillman and H. Shechter.
6 Jun 62, 8p
Contract AF61 052 621

Unclassified report

Descriptors: (*Iron compounds, Transition temperature), (*Mossbauer effect, Iron compounds), (*Antiferromagnetism, Iron compounds), Measurement, Calibration, Nuclear scattering, Nuclear diffraction analysis, Thermal expansion, Magnetic fields, Ferromagnetism, Electronic equipment, Furnaces, Dilatometers, Anisotropy, Nuclear spins, Ferrites, Israel.

The antiferromagnetic Neel point in a-Fe2O3 is found to be 690C by Mossbauer analysis of the nuclear Zeeman splitting. A summary is presented of the conflicting evidence on this point. (Author)

AD-602 469 Div. 25, 20
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
DTA AND MOSSBAUER STUDIES IN RARE EARTH ORTHOFERRITES.
Technical note no. 3,
by M. Eibschutz, G. Gorodetsky, S. Shtrikman, and D. Treves. 27 Oct 63, 14p
Contract AF61 052 654

Unclassified report

Descriptors: (*Ferrites, Mossbauer effect), (*Iron compounds, Transition temperatures), (*Mossbauer effect, Iron compounds), Rare earth compounds, Nuclear scattering, Quadrupole moments, Isomeric transitions, Ferromagnetism, Hyperfine structure, Thermal conductivity, Electronic equipment, Crystal structure, Spectrum analyzers, Calibration, Nuclear spins, Copper, Silver, Voltage, Israel.

Curie temperatures of 14 different orthoferrites with the chemical formula RFeO3, (R=Y La, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu) were measured by differential thermal analysis. Hyperfine interactions of the Fe57 nucleus in the same materials were determined from their Mossbauer spectra. It is found that the quadrupole splitting, with the exception of the case of Sm, isomer shift, Curie temperature and internal field vary regularly with the ionic size of R. (Author)

AD-602 470 Div. 25, 20
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
THE SECOND ORDER SUSCEPTIBILITY TERMS IN ORTHOFERRITES AT ROOM TEMPERATURE.
Technical note no. 2,
by G. Gorodetsky and D. Treves. 15 Sep 63, 22p
Contract AF61 052 654

Unclassified report

Descriptors: (*Ferrites, Anisotropy), (*Ferromagnetism, Iron compounds), Mathematical prediction, Rare earth compounds, Torque, Measurement, Crystal lattices, Hamiltonian, Magnetic fields, Neutron diffraction analysis, Antiferromagnetism, Isotropism, Equations, Magnometers, Hall effect, Impurities, Israel.

Two possible mechanisms for weak ferromagnetism, single ion magnetocrystalline anisotropy and antisymmetric exchange, are examined on orthoferrites which contain a paramagnetic rare earth. The study was done by comparing the ferromagnetic components and the terms of the second order susceptibility tensor that are obtained from torque measurements to the equivalent values calculated from hamiltonians based on above mechanisms. The results show, that the weak ferromagnetism is due mainly to the antisymmetric exchange mechanism. (Author)

AD-602 471 Div. 25
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
MAGNETIC SYMMETRY AND ELECTRON NUCLEUS-INTERACTIONS IN MAGNETIC CRYSTALS.
Technical note no. 1,
by S. Shtrikman and D. Treves. 16 Feb 63, 6p
Contract AF61 052 654

Unclassified report

Descriptors: (*Magnetic materials, Symmetry (Crystallography), Crystal structure, Crystals, Manganese compounds, Fluorides, Magnetic fields, Electric fields, Nuclear moments, Nuclear magnetic resonance, Hamiltonian, Israel.

The significance of the magnetic site symmetry, in the determination of the dependence of the electron nucleus

Supported by the National Science Foundation and the Office of Naval Research.

Descriptors: (*Antiferromagnetism, Cobalt compounds), (*Cobalt compounds, Chlorides), Magnetic materials, Crystals, Hydrates, Specific heat, Cryogenics, Thermodynamics.

AD-602 520 Div. 25
OTS Prices: HC $1.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE LOW TEMPERATURE MAGNETIC SUSCEPTIBILITY OF Mn(HCO2)2.2H2O.
Technical rept. no. 23,
by A. Foner Cohen, S. A. Friedberg and G. R. Wagner.
22 Jun 64, 8p
Contract Nonr760 05, Proj. NR018 301

Unclassified report

Jointly sponsored by the National Science Foundation and the Office of Naval Research.

Descriptors: (*Metalorganic compounds, Magnetic properties), (*Manganese compounds, Formates), Magnetic materials, Hydrates, Single crystals, Powders, Cryogenics.

AD-602 523 Div. 25
OTS Prices: HC $1.00/MF $0.50

Institute for the Study of Rate Processes, Univ. of Utah, Salt Lake City.
MATTER UNDER ULTRA-HIGH PRESSURES AND TEMPERATURES.
Progress rept. no. 5, 1 Oct 63-31 Mar 64,
by Henry Eyring and Terrell N. Andersen. 31 Mar 64, 4p
Grant DA ARO D31 124G508

Unclassified report

Descriptors: (*Materials, High-pressure research), (*High-pressure research, Materials), (*High-temperature research, Materials), Boron, Glass, Organic compounds, Tantalum, Hydrogen, Transition elements, Physical properties, Luminescence, Phase shift, Presses (Machinery).

AD-602 525 Div. 25
OTS Prices: HC $3.00/MF $0.75

Dayton Univ., Ohio. Research Inst.
INVESTIGATION OF LASER BEAM CROSS-SECTION WITH RESPECT TO INTENSITY AND TIME.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63,
by Werner Rambauske and Michael K. Barnoski.
31 Mar 63, 72p
Contract AF33 657 9014
AD 405 482

Unclassified report

Descriptors: (*Lasers, Optical properties), Light pulses, Reflection, Recording systems, Optical equipment, Oscilloscopes, Detectors, Photomultipliers, Circuits, Polynomials, Ruby, Time, Intensity.

In order to extract information concerning various targets by monitoring the nature of laser light reflections from these targets, it is essential that the radiation incident on the target be known. If this, in addition to the reflected radiation, was 'unknown', there would not exist a base for comparison. Thus the nature of the intensity and time variation across the cross-section of the laser beam must be pre-determined. It was discovered that no two points in the beam's cross-section displayed the same intensity versus time variation. These results were obtained by utilizing two identical detection systems positioned at various points in the beam's cross-section. Photographic recording of the dual beam scope traces are included in the report. In addition to this, the average intensity over a 50 microsecond interval versus lateral distance through the beam was determined and the results plotted. A bell-shaped curve was obtained. Further investigation of the observed phenomena in the beam's cross-section is required. (Author)

AD-602 536 Div. 25, 8
OTS Prices: HC $3.00/MF $0.75

Maryland Univ., College Park.
SUPERCONDUCTIVITY IN A STRONG SPIN EXCHANGE FIELD.
by Peter Fulde and Richard A. Ferrell. Dec 63, 60p
MUP TR344

Unclassified report

Research supported in part by the Air Force Office of Scientific Research and by ARPA.

Descriptors: (*Ferromagnetic materials, Superconductivity), (*Superconductivity, Quantum mechanics), Electrons, Spin, Polarization, Electron transitions, Specific heat, Tunneling (Electronics), Anisotropy, Superconductors, Impurities, Cryogenics.

A strong exchange field, such as produced by ferromagnetically aligned impurities in a metal, will tend to polarize the conduction electron spins. If the metal is a superconductor, this will happen only if the spin-exchange field is sufficiently strong compared to the energy gap. When the field is strong enough to break many electron pairs, the self-consistent gap equation is modified and a new type of depaired superconducting ground state occurs. In the idealization of a spatially uniform exchange field with no scattering, it is found that the depaired state has a spatially dependent complex Gorkov field. The presence of the 'normal' electrons from the broken pairs reduces the total current to zero, gives the depaired state some spin polarization, and results in almost normal Sommerfeld specific heat and single-electron tunneling characteristics. The non-zero value of the pairing momentum also gives rise to an unusual anisotropic electrodynamic behavior of the superconductor, as well as to a degenerate ground state and low-lying collective excitations. (Author)

AD-602 542 Div. 25
OTS Prices: HC $2.00/MF $0.50

Pratt and Whitney Aircraft, East Hartford, Conn.
DYNAMIC THERMAL AND PRESSURE STRESSES IN THIN SPHERICAL SHELL.
Interim technical rept.,
by H. Kraus. 8 Apr 64, 28p PWA 2329
Contract DA31 124ARO D146, Proj. 20010501B700

Unclassified report

Descriptors: (*Hemispherical shells, Stresses), Thermal stresses, Loading (Mechanics), Statics, Vibration, Boundary value problems, Differential equations, Mathematical analysis, Spheres.

A study is made of the transient response of a non-shallow spherical shell insulated at its inner surface and subjected to a suddenly applied, and subsequently constant, heat flux over its outer surface. The shell is assumed to be closed at its apex and either clamped or simply supported at its edge. Also considered is the transient response of such a shell to step changes of pressure parallel and/or perpendicular to its surface. The primary goal of the investigation is the evaluation of the effect of inertia in transient thermal stress problems involving thin shells. Heretofore, such problems have been handled by means of a quasi-static formulation in which the inertia of the shell was ignored and time entered only as a parameter from

Instruments were used to investigate the Fermi Resonance, (L/L ± 2) resonance and other phenomena in several isotopic nitrous oxides by a study of the spectra in the 8 and 17 micron regions. (Author)

AD-602 501 Div. 25
OTS Prices: HC $1.00/MF $0.50

Nobel Inst. for Physics, Stockholm (Sweden).
DEVELOPMENT OF METHODS AND TECHNIQUES FOR INVESTIGATION IN THE VACUUM ULTRAVIOLET AND RESEARCH IN THE REGION OF RADIATION.
Final rept. for 1 Jul-30 Sep 63,
by Manne Siegbahn. 15 Nov 63, 18p
Contract AF61 052 462
Unclassified report

Descriptors: (*Ultraviolet spectroscopy, Instrumentation), Diffraction gratings, Mirrors, Spectrum analyzers, Vacuum systems, Lighting equipment, Optical instruments, Sweden.

Gratings for grazing incidence were ruled and tested. Two spectrometers, one for normal incidence and the other for grazing incidence, were designed and built. The instruments cover the range from 2000 to 20 Angstrom units. Several types of light sources intended for use in projected UV studies were also developed.

AD-602 505 Div. 25
OTS Prices: HC $3.00/MF $0.75

Westinghouse Research Labs., Pittsburgh, Pa.
DETERMINATION OF MOMENTUM TRANSFER AND INELASTIC COLLISION CROSS SECTIONS FOR ELECTRONS IN NITROGEN USING TRANSPORT COEFFICIENTS.
Scientific paper,
by A. G. Engelhardt, A. V. Phelps and C. G. Risk.
23 Mar 64, 68p WRL 64 928 113P4
Unclassified report

This research was sponsored in part by the Air Force Weapons Lab.

Descriptors: (*Nitrogen, Electron bombardment), (*Electrons, Transport properties), Momentum, Inelastic scattering, Excitation, Ionization, Electric fields, Quadrupole moments.

Momentum transfer and inelastic collision cross sections for electrons in N2 were obtained from electron transport coefficients for values of the electron energy between about 0.003 and 30 eV. The cross sections for vibrational excitation are consistent with those of Schulz provided the sum total cross section is normalized to 5.5 x 10 to the-16th power sq cm at 2.2 eV. Furthermore, a tail extending down to the threshold of 0.29 eV is postulated for the v = 1 vibrational level. Electronic excitation is approximated by a set of six effective cross sections which, for the most part, are consistent with previous results. The ionization cross section of Tate and Smith was used. The mean energy of electrons in N2 subjected to high frequency ac electric fields is found to be single valued function of the electric field E divided by the ac radian frequency, although there are regions of E/radian frequency where the mean energy increases extremely rapidly with E/radian frequency. (Author)

AD-602 512 Div. 25
OTS Prices: HC $5.00/MF $1.00

North American Aviation, Inc., Downey, Calif.
INVESTIGATION OF STRUCTURAL IMPLICATIONS OF METEOROID IMPACT.
Rept. for Apr 62-Jun 64,
by F. C. Posever and C. N. Scully. Jul 64, 168p
SID 64 656
Contract AF33 657 8159, Proj. 1368, Task 136808
FDL TDR64 96
Unclassified report

Descriptors: (*Hypervelocity projectiles, Terminal ballistics), (*Meteorites, Terminal ballistics), Space environmental conditions, Armor plate, Honeycomb cores, Glass, Aluminum alloys, Magnesium alloys, Beryllium, Lithium, Steel, Cratering, Penetration, Photometers, Photomicography, Isocyanate plastics, Space flight, Equations.

Cratering and penetration data were obtained experimentally with intact, spherical, 50-micron-diameter borosilicate-glass projectiles at velocities ranging from 8,000 to 60,000 feet per second in the Mark IV hypervelocity projectile accelerator facility at S and ID. Empirical constants for Charters and Summers equation, and for the logarithmic law proposed by Herrmann and Jones were determined from experimental results on quasi-infinite targets for aluminum, magnesium, beryllium, steel, and glass target materials. In the case of aluminum and steel, a relatively close correspondence exists at high velocities between Bjork's theoretical penetration results and the empirical logarithmic law proposed by Herrmann and Jones. The correlations of quasi-infinite target data with the equations of Charters and Summers, and Herrmann and Jones give comparable results in the experimental velocity range. (Author)

AD-602 514 Div. 25
OTS Prices: HC $1.00/MF $0.50

Sheffield Univ. (England).
NUCLEAR MAGNETIC RESONANCE IN FERROMAGNETIC AND ANTIFERROMAGNETIC ALLOYS.
Final technical rept. for 1 Jun 63-31 May 64.
31 May 64, 24p
Contract DA91 591EUC2907
Unclassified report

Descriptors: (*Ferromagnetic materials, Nuclear magnetic resonance), (*Antiferromagnetism, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Ferromagnetic materials), Oscillators, Very high frequency, Frequency modulation, Coaxial cables, Ultrahigh frequency, Magnetic moments, Copper alloys, Manganese alloys, Indium alloys, Great Britan.

The report concerns the initial stages of investigations into nuclear magnetic resonance in ferromagnetic materials. The resonances are observed in zero applied magnetic field, so that the experiments result in a value for the effective magnetic field at the nucleus. The types of apparatus used to observe nuclear magnetic resonance are briefly reviewed, together with the reasons for selecting a V.H.F. variable frequency, frequency modulated marginal oscillator. The marginal oscillators constructed are described, together with their limitations. A table of other reported nuclear magnetic resonances in ferromagnetic materials is given and it is shown empirically that for materials of large magnetic moment the resonant frequency is likely to be high. This has prompted the redesign of the coaxial line oscillator to operate in the U.H.F. range which is described in detail. (Author)

AD-602 519 Div. 25
OTS Prices: HC $1.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE HEAT CAPACITY OF THE ANTIFERROMAGNET CoCl2.6H2O NEAR ITS NEEL POINT.
Technical rept. no. 22,
by J. Skalyo, Jr. and S. A. Friedberg. 13 May 64, 10p
Contract Nonr760 05, Proj. NR013 301 Unclassified report

AD-602 560 Div. 25, 8, 20
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TRANSMISSION OF A CHARGED PARTICLE THROUGH AN ELECTRON-ION BEAM,
by N. L. Tsintsadze. 27 Dec 63, 12p
FTD MT63 152; TT 64 11928

Unclassified report

Edited machine trans. of A[kademiya] N[auk] Gruzinskoi SSR [Tiflis]. Institut Fiziki. Trudy, 1960, v. 7, p. 193-199.

Descriptors: (*Electron beams, Charged particles), (*Ion beams, Charged particles), (*Charged particles, Particle trajectories), Particle beams, Energy, Oscillation, Integral equations, Waveguides, Cerenkov radiation, Plasma physics, Microwave amplifiers, Particle accelerators, USSR.

The transmission of a charged particle moving through an electron-ion beam along its axis is considered. The losses of energy during this transmission are determined. (Author)

AD-602 561 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command Wright-Patterson AFB, Ohio.
STABILIZATION OF 'UNIVERSAL' UNSTABILITY OF A WEAKLY INHOMOGENEOUS PLASMA WITH RELATIVISTIC ELECTRONS IN A MAGNETIC FIELD,
by G. M. Zaslavskii. 26 Dec 63, 9p
FTD MT63 149; TT 64 11929

Unclassified report

Edited machine trans. of A[kademiya] N[auk] SSSR. Doklady, 1963, v. 148, no. 4, p. 803-805.

Descriptors: (*Plasma oscillations, Stabilization), Magnetic pinch, Electrons, Relativity theory, Magnetic fields, Stability, Inequalities, Statistical functions, USSR.

Consideration is given to a plasma with non-relativistic ions and relativistic electrons. The electronic larmor radius compares with the ionic one and calculation of its finiteness, leads to stabilization of the plasma relative to 'universal' instability. (Author)

AD-602 569 Div. 25, 15
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONSTRUCTION OF AN APPROXIMATE THEORY OF SHELLS BY MEANS OF ASYMPTOTIC INTEGRATION OF EQUATIONS OF THE THEORY OF ELASTICITY,
by A. L. Gol'denveizer. 6 Apr 64, 26p
FTD MT63 240; TT 64 11937

Unclassified report

Edited machine trans. of Prikladnaya Matematika i Mekhanika (USSR) 1963, v. 27, no. 4, p. 593-608.

Descriptors: (*Elastic shells, Theory), (*Numerical analysis, Iterative methods), Elasticity, Theory, Integration, Differential equations, Tensor analysis, Stresses, Deformation, USSR.

AD-602 573 Div. 25, 7
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON ACCELERATION OF PLASMOIDS IN COAXIAL SOURCE,
by A. M. Kovalev. 2 Mar 64, 15p
FTD MT64 31; TT 64 11941

Unclassified report

Edited machine trans. of mono. Konferentsiya po Fizike Plazmy i Probleme Upravlyaemogo Termoladernogo Sinteza (Conference on Plasma Physics and the Problem of Controlled Thermonuclear Synthesis) [(no. 2) Kharkov, 1960. Doklady] Kiev [1963] p. 231-237.

Descriptors: (*Charged particles, Acceleration) (*Plasma physics, Particle accelerator techniques), Particle accelerators, Capacitors, Secondary emission, Batteries and components, Coaxial cables, Electrodes, Mathematical analysis, USSR.

An investigation was made on acceleration of plasmoids of constant and variable mass in coaxial sources. In coaxial sources with identical parameters the acceleration of plasmoids of constant mass was approximately twice as effective (with respect to speed) as the acceleration of plasmoids of variable mass.

AD-602 574 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE INTERACTION OF PLASMOIDS WITH A SPACE-PERIODIC MAGNETIC FIELD.
by A. A. Kalmykov, V. I. Tereshin, S. A. Trubchaninov and B. G. Safronov. 2 Mar 64, 12p
FTD MT64 29; TT 64 11942

Unclassified report

Edited machine trans. of mono. Konferentsiya po Fizike Plazmy i Probleme Upravlyaemogo Termoladernogo Sinteza (Conference on Plasma Physics and the Problem of Controlled Thermonuclear Synthesis) [(no. 2) Kharkov, 1960. Doklady] Kiev [1963] p. 223-228.

Descriptors: (*Charged particles, Magnetic fields), (*Paramagnetic resonance, Ions), Energy, Particle accelerators, Velocity, Injection, Oscillographs, USSR.

The work is devoted to the investigation of parametric resonance in an ionic component of plasmoids in a space periodic magnetic field.

AD-602 591 Div. 25, 15
OTS Prices: HC $3.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NONLINEAR TENSOR FUNCTIONS FROM SEVERAL TENSOR ARGUMENTS [AND] ON ONE METHOD OF SOLVING AN ELASTO-PLASTIC PROBLEM,
by V. V. Lokhin, L. I. Sedov, and G. P. Cherepanov.
30 Mar 64, 51p
FTD MT63 226, TT 64 11962

Unclassified report

Edited machine trans. of Prikladnaya Matematika i Mekhanika (USSR) 1963, v. 27, no. 3, p. 393-417, 428-435.

Descriptors: (*Tensor analysis, Functions), (*Elasticity, Boundary value problems), Plasticity, Harmonic analysis, Complex variables, S-matrix, Differential geometry, Transformations (Mathematics), Equations, Symmetry (Crystallography).

the transient temperature distribution. This becomes a special case of the present, more general, solution. Since the determination of the response of the shell to a transient mechanical load is another special case of the analysis this too will be presented. (Author)

AD-602 543 Div. 25
OTS Prices: HC $6.00/MF $1.25

Gas Dynamics Lab., Northwestern Univ., Evanston, Ill.
MICROWAVE DIAGNOSTICS OF ARC HEATED ARGON PLASMA FLOWS,
by R. C. Warder, Jr. Apr 63, 238p NU-GDL B163
Contract AF49 638 879; Grant AF AFOSR62 307
Unclassified report

Descriptors: (*Plasma medium, Electrical properties), Microwaves, Propagation, Attenuation, Phase shifts, Electrons, Density, Electrical conductance, Supersonic flow, Magnetic fields, Electric arcs, Argon.

An experimental investigation of the electrical properties of arc-heated plasma flows was conducted using microwave diagnostic techniques. The basic theory underlying the propagation of electromagnetic waves in isotropic and anisotropic plasmas necessary for the interpretation of the microwave measurements is presented. Phase shift and attenuation measurements at 78 and 85.3 kmc were made to determine the electron density and electron collision frequency of the plasma flows. The electron densities which were determined experimentally agree quite well for the two operating frequencies. Comparison of the experimental electron densities with theoretical predictions indicates that the plasma flow is not in equilibrium. The attenuation measurements at the two frequencies agree qualitatively; however, the electron collision frequencies derived from these measurements do not agree quantitatively. Comparison with theoretical predictions indicates that electron-ion collisions are the predominant dissipative mechanism. (Author)

AD-602 547 Div. 25, 8
OTS Prices: HC $4.00/MF $0.75

Washington Univ., St. Louis, Mo.
SECONDARY ELECTRON EMMISSION FROM SPECIALLY PREPARED TARGETS.
Scientific rept. no. 1,
by Julius Brown and Robert N. Varney. 31 Jan 63, 102p
Contract AF19 604 8435, Proj. 6692, Task 669201
AFCRL 63 728
Unclassified report

Descriptors: (*Semiconductors, Secondary emission), (*Secondary emission, Targets), Films, Thickness, Solidified gases, Carbon dioxide, Xenon, Electron bombardment, Electron transitions, Laboratory equipment, Vacuum systems, Ionization gages, Circuits.

The research involved a basically new technique, that of using frozen gases at 77K temperature (boiling nitrogen) as semi-conducting surfaces. Surfaces of frozen xenon and of frozen carbon dioxide were formed on an underlying conductor. Thickness estimated to range from 25 atomic layers to 20,000 layers were produced. Under impact of a primary electron beam a surface charge developed on the film. The size of the charge could be controlled by the potential of a surrounding collector electrode. The apparent conductivity of the xenon film was considerably greater than that of the carbon dioxide film, an observation which seems to show the relative ease with which electrons can pass through the respective films. It was not found possible to cause a charge to reside on the film surface for a protracted period.

AD-602 548 Div. 25
OTS Prices: HC $1.00/MF $0.50

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge
HIGH DENSITY PLASMA PHYSICS.
Final rept. for 1 Oct 59-31 Dec 63,
by Sanborn C. Brown. 31 Jan 64, 6p
Contract AF19 604 5992, Proj. 5634, Task 563402
AFCRL 64 68, AD 433 588
Unclassified report

Descriptors: (*Plasma physics, Bibliographies), (*Bibliographies, Plasma physics), Plasma media, Density, Magnetic fields.

A bibliography of the 20 publications generated under the contract is given. The work concerned the fundamental properties of plasmas with emphasis on high-density plasmas and plasmas in magnetic fields.

AD-602 552 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE CORRELATION BETWEEN INTENSITIES OF STRESS AND DEFORMATION IN THE THEORY OF PLASTICITY,
by A. Zilautss. 28 Jan 64, 12p
FTD MT63 216, TT 64 11950
Unclassified report

Edited machine trans. of A[kademiya] N[auk] Latviiskoi SSR [Riga]. Izvestiya, 1963, no. 5(190) p. 51-56.

Descriptors: (*Stresses, Plasticity), (*Deformation, Plasticity), (*Plasticity, Theory), Theory, Integration, Polynomials, Mathematics, Loading (Mechanics), Shear stresses, USSR.

Using the experimentally determined independence of the correlation between the intensities of stresses and deformations from the stress condition during the condition of simple loading, it was found that the function of local deformations is characteristic of the material and also does not depend on the stress condition. The analytical expression of this function is taken in the form of a polynomial. A convenient method is given for the calculation of coefficients of the polynomial by a curve of simple tension. (Author)

AD-602 557 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RESEARCH ON HEAT EXCHANGE IN VACUUM,
by A. N. Devoino. 20 Feb 64, 14p
FTD MT63 09; TT 64 11925
Unclassified report

Edited machine trans. of A[kademiya] N[avuk] BSSR [Minsk]. Instytut Energetyki. Trudy, 1960, v. 11, p. 31-39.

Descriptors: (*Vacuum apparatus, Heat transfer), (*Heat transfer, Low pressure research), (*Thermistors, Vacuum apparatus), Vacuum, Pressure, USSR, Boundary layer, Barometric pressure, Gases, Upper atmosphere, Heat transfer coefficients Semiconductors.

The relation of the coefficient of heat exchange to pressure was received for thermistor TST-0,5 in a range of pressures from atmospheric to 0,01 of mercury. These relations can be used for calculating the thermal processes of thermistors of such type during their work in the upper layers of the atmosphere and also in vacuum instruments and apparatus. The data received can be applied also for calculating thermistor TST-0,5 as a vacuum depth meter. (Author)

large compared to its radius. The effect of surface tension is to increase sound attenuation in two-phase medium by increasing the thermal dissipation. This effect is important in the suspension of gaseous bubbles in liquid for small droplets and is negligible in the case of a gaseous medium containing liquid droplets. The explicit forms for attenuation, the drag force on droplets, and the heat transfer rate between phases are given for the case which is applicable to a gas containing liquid and solid droplets. The expression for the attenuation which is applicable to the suspension of gaseous bubbles in a liquid is also given and is found to be completely dominated by the thermal dissipation. (Author).

AD-602 629 Div. 25, 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PREPARATION OF MOLYBDENUM SINGLE CRYSTALS BY ELECTRON-BEAM FLOATING-ZONE MELTING,
by Nai-pen Ming, Ts'un-yi Fan, Ch'i Li, Yu-shan Hsu and Tuan Feng. 10 July 64, 12p
FTD TT64 350; TT 64 11977

Unclassified report

Edited trans. of Wu Li Hsueh Pao (Chinese People's Republic) 1963, v. 19, no. 3, p. 160-164.

Descriptors: (*Molybdenum, Single crystals), (*Single crystals, Zone melting), (*Zone melting, Electron beams), Crystal growth, Purification, Melting, Vacuum systems, Electron guns, Circuits, Crystal structure, Evaporation, Refining (Metallurgy), China.

The paper briefly describes the design and operation of a 1.5 kw electron-beam floating-zone melting unit. Using this unit molybdenum single crystals 4 mm in diameter and 2 to 5 cm long were prepared, and the laboratory technique of preparing single crystals with controlled orientation was mastered. The molybdenum single crystals prepared showed no preferred orientation; microscopic examination disclosed a large number of terraces on the crystal surface (with step heights ranging from 0.000023 to 0.00063 cm), which were tentatively identified as evaporation terraces. (Author)

AD-602 640 Div. 25
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
ORDERED MAGNETISM IN SOLIDS.
Annual summary rept. (Technical note no. 3),
by S. Shtrikman and D. Treves. 1 Jan 63, 13p
Contract AF61 052 654

Unclassified report

Descriptors: (*Magnetism, Measurement), (*Ferrites, Magnetic properties), Mossbauer effect, Nuclear spectroscopy, Microwave spectroscopy, Very high frequency, Paramagnetic materials, Spectrum analyzers, Nuclear magnetic resonance, Instrumentation, Single crystals, Crystal growth, K band, Israel, Solids.

A summary is given of studies of the magnetic structures of various solids by means of static magnetic measurements; and VHF, microwave, and Mossbauer spectroscopy.

AD-602 654 Div. 25
OTS Prices: HC $1.00/MF $0.50

Paris Univ. (France).
KINETIC STUDY OF ELECTRONS IN WEAKLY IONIZED GASES FOR ARGON OR GAS MIXTURES ARGON-HYDROGEN, ARGON-CO.
Technical note no. 1,
by A. Constantin, J. Godart, J. J. Hamm, R. Rious and J. L. Delcroix. 1964, 14p
Contract AF61 052 727
AFCRL 64 444

Unclassified report

Descriptors: (*Electrons, Drift), (*Argon, Gas ionization), Electric fields, Plasma medium, Elastic scattering, Diffusion, Electron transitions, Statistical functions, Hydrogen, Carbon compounds, Monoxides, Discharge tubes.

A study of the drift velocity of electrons due to the electric field in a weakly ionized gas of pure argon is proposed. Theoretical considerations are given and the apparatus to be used is described.

AD-602 666 Div. 25, 5
OTS Prices: HC $2.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
SOLID STATE LIGHT VALVE STUDY.
by Edward J. Calucci, Bruce C. Ganzler and Allen C. Clough. Jun 64, 36p
Prdj. 5597, Task 559702
RADC TDR64 192

Unclassified report

Descriptors: (*Electron optics, Display systems), (*Light, Modulation), Crystals, Electrical properties, Optical properties, Light transmission, Valves, Command and Control systems, Models (Simulation), Feasibility studies, Solid state physics.

The feasibility of using an electro-optic crystal as a modulating element in a light valve projection display system is demonstrated. A description of the electro-optic effect in solid state crystals and measurements of their electrical and optical properties are presented. A typical display concept is considered for possible application to command and control systems. A description of an experimental model, illustrated images, and a discussion of the various display parameters are also included. (Author)

AD-602 670 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
SOME NONLINEAR PROPERTIES OF ELECTRON-HOLE PLASMAS SUSTAINING THE HELICAL INSTABILITY,
by Betsy Ancker-Johnson.
Apr 64, 38p D1 82 0339

Unclassified report

Also available from the author.

Descriptors: (*Plasma physics, Semiconductors), Electromagnetic properties, Plasma oscillations, Helixes, Stability, Plasma medium, Gas ionization, Intermetallic compounds, Indium alloys, Antimony alloys, Magnetic fields, Electrons, Ions, Electric fields.

There are several areas of qualitative agreement among the non-linear properties of the helical instability in electron-ion and electron-hole plasmas. These include (1) a similar dependence of E on B throughout the range of B up to several times Bth; (2) regions of a linear increase in frequency as a function of B; (3) the reoccurrence of a nearly homogeneous plasma at some B > Bth; (4) turbulent behavior under highly supercritical conditions; (5) the form of the dependence of the helix self-B on the applied

AD-602 596 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE DOPPLER EFFECT AT VELOCITIES GREATER THAN THE SPEED OF LIGHT,
by V. L. Ginzburg. 22 Apr 64, 10p
FTD MT63 187, TT 6411967

Unclassified report

Ob Effekte Dopplera pri Sverkhsvetovoi Skorosti, edited machine trans. of A[kademiya] N [auk] SSSR. Doklady, 1947, v. 56, no. 6, p. 583-586.

Descriptors: (*Doppler effect, Field theory), Photons, Electromagnetic waves, Cerenkov radiation, Quantum mechanics, Relativity theory, Atoms, Excitation, Light, Optical phenomena, USSR.

AD-602 601 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONCERNING STABILITY OF IONIC LONGITUDINAL OSCILLATIONS OF PLASMA IN MAGNETIC FIELD,
by V. N. Oraevskii. 15 Jun 63, 9p
FTD MT63 11, TT 64 11972

Unclassified report

Machine trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) 1962, no. 5, p. 39-41.

Descriptors: (*Plasma oscillations, Stability), Plasma physics, Magnetic fields, Ions, Perturbation theory, Magnetohydrodynamics, Propagation, Excitation, Ion beams, Numerical analysis, Differential geometry, Matrix algebra, Algebra, USSR.

States of rarefied plasma are frequently unstable with respect to excitation of the various kinds of oscillations. Because of a nonlinear interaction of waves in such cases, the appearance of turbulent conditions is possible. In order to describe, at least qualitatively, the evolution of any spectrum of oscillations, it is necessary to know mechanisms of nonlinear interaction of waves, causing excitation and attenuation of oscillations. This work investigated the stability of nonlinear steady-state ionic longitudinal oscillations of plasma in magnetic field. It was shown that at definite values of plasma parameters, ionic longitudinal oscillations are unstable with respect to excitation of two transverse waves.

AD-602 602 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRICAL CONDUCTIVITY AND THERMOELECTROMOTIVE FORCE OF SOLID SOLUTIONS OF THE SYSTEMS: Bi2Se3 -- Sb2 Te3 AND Bi2Te3 -- Sb2Se3,
by V. G. Kuznetsov, K. K. Palkina, and A. V. Dmitriev.
22 Apr 64, 13p
FTD MT64 08; TT 64 11973

Unclassified report

Edited machine trans. of Zhurnal Neorganicheskoi Khimii (USSR) 1963, v. 8, no. 9, p. 2136-2139.

Descriptors: (*Solid solutions, Electrical properties), (*Bismuth compounds, Chalogens), (*Antimony compounds, Chalcogens), Minerals, Selenides, Tellurides, Electrical conductance, Thermoelectricity, Semiconductors, Phase studies, Solid state physics, USSR.

On the basis of measurements of electrical conductivity and thermal E M F of solid solutions with laminar structure of the tetradymite type, it was established that in the system Bi2Se3 -- Sb2Te3 at room temperature, electrical conductivity changes on a curve with a minimum at composition of approximately 70 mole % Sb2Te3. Thermal E M F of the n-type, characteristic for Bi2Se3, with the growth of Sb2Te3 in solid solutions to approx. 50 mole % is increased from -60 to -116 micro v/deg, and at approximately 60 mole % Sb2Te3 a change is observed in the sign of conductance from minus to plus and a growth of thermal E M F to maximum + 360 micro v/deg at 70 mole % Sb2Te3. In the system Bi2Te3 -- Sb2Se3 at room temperature, electrical conductivity of an n-type solid solution based on Bi2Te3 decreases with the growth of concentration of Sb2Se3 on a smooth curve, and thermal E M F to 50 mole % Sb2Se3 is somewhat increased (from 100 to 127 micro v/deg), and then quickly decreases to 6 micro v/deg at 70 mole % Sb2Se3. (Author)

AD-602 603 Div. 25
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONCERNING INFLUENCE MOMENTLESS TENSE STATE ON SPECTRA OF NATURAL OSCILLATIONS OF THIN ELASTIC SHELLS,
by V. V. Bolotin. 17 Apr 63, 26p
FTD MT63 22; TT 64 11974

Unclassified report

Edited machine trans. of A[kademiya] N[auk] SSSR. O[tdelenie] T[ekhnicheskikh] N[auk]. Izvestiya: Mekhanika i Mashinostroenie, 1962 no. 4, p. 52-60.

Descriptors: (*Elastic shells, Oscillation), Frequency, Stresses, Strain (Mechanics), Statics, Equations, Mathematical analysis, USSR.

Method used for construction of asymptotic solution of problem concerning natural oscillations of thin elastic shells taking into account initial momentless state of strain is presented. Known equations for states with large indices of variability are given. Boundary of application of method for shells of positive, zero and negative Gaussian curvature is established. As example, oscillation of spherical panel, supported on right angle (in generalized meaning) by contour and loaded gas pressure is considered.

AD-602 622 Div. 25
OTS Prices: HC $2.00/MF $0.50

Brown Univ., Providence, R. I.
THE ATTENUATION OF ACOUSTIC WAVES IN A TWO-PHASE MEDIUM.
Condensed rept.
by Joseph C. F. Chow. May 63, 28p ABL X96
Contract NOrd 16640

Unclassified report

Descriptors: (*Sound, Attenuation), (*Aerosols, Acoustic properties), (*Bubbles, Acoustic properties), Drops, Surface tension, Drag, Heat transfer, Phase studies, Acoustic insulation.

A study is made of the attenuation of acoustic waves by a suspension of fluid droplets in a fluid medium. Special attention is given to the case of small droplets for which the effect of the surface tension is not negligible. The droplets are allowed to execute large translational motion and to undergo a small deformation from a spherical shape. It is shown that the result of Epstein and Carhart on the attenuation of sound waves in a gas with the suspension of liquid droplets is applicable even when the displacement of the droplet is

by T. Y. Yip and F. H. Medleton. 1 May 64, 43p
Contract Nonr396 12

Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Wave transmission, Numerical analysis), Iterative methods, Boundary valve problems, Mathematical models, Fluids, Solids, Elasticity, Wedges, Reflection, Attenuation, Diffraction.

This study is concerned with surface waves which propagate along an interface between a fluid and an elastic solid. In particular, interesting transmission and radiation behavior is caused by a wedge-shaped discontinuity in the interface. An iteration procedure is employed by which the boundary conditions on either face of the wedge are alternately satisfy. Using only the first iteration produces a transmission coefficient. Numerical data is presented showing the manner in which the transmission coefficient depends upon the angle of the discontinuity. Results are compared with those of related studies appearing in the recent literature. (Author)

AD-602 729 Div. 25
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Lab., Corona, Calif.
PYROELECTRIC SENSITIVITY OF TRIGLYCINE SULFATE DETECTORS,
by D. J. White. 1 Jul 64, 25p
NOLC 601

Unclassified report

Descriptors: (*Ferroelectric materials, Glycines), (*Detectors, Sensitivity), (*Glycines, Sulfates), Single crystals, Amino acids, Thermoelectric effect, Electromagnetic radiation, Modulation, Electromagnetic pulses.

Expressions are derived for the theoretical pyroelectric current sensitivity of triglycine sulfate in response to chopped or modulated electromagnetic radiation. Sinusoidal chopping, amplitude modulation, square wave modulation, pulses, and step functions of the radiation are considered. These expressions are compared with the experimental results achieved with various pyroelectric detectors, and it is found that the sensitivity achieved varies from a fraction of a percent to approximately 100 percent of the theoretical values. (Author)

AD-602 730 Div. 25
OTS Prices: HC $3.00/MF $0.75

Aerospace Technology Div., Washington, D. C.
MAGNETIC FIELD PRODUCTION: COMPREHENSIVE REPORT.
20 Jul 64, 89p
ATD P64 46; TT 64 71123

Unclassified report

Survey of Soviet-Bloc scientific and technical literature.

Descriptors: (*Magnetic fields, Production), (*Superconductivity, Magnets), (*Magnet coils, Magnetic fields), Electromagnets, Magnetic materials, Pulse generators, Plasma physics, Particles, Thermonuclear reactions, Containment, Reviews, Bibliographies, USSR.

In the first and second chapters, the production of pulsed and continuous fields is considered; the third chapter deals with force-free fields; in the fourth chapter Soviet research on superconductivity is reviewed; the fifth and sixth chapters summarily indicate certain aspects of Soviet work on accelerator magnets and magnets for plasma containment. Finally, a brief assessment is given of current Soviet trends in high magnetic field production. Though in principle the report is limited to the years 1962 and 1963, numerous references are made to earlier sources in order to indicate more generally the character of Soviet studies in this field.

AD-602 748 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Dynatech Corp., Cambridge, Mass.
INVESTIGATION OF ELECTROMAGNETIC AND THERMAL EFFECTS IN SUPERCONDUCTING GENERATORS.
Quarterly rept. no. 1,
by H. W. Mooncai, R. L. Mela, R. Hancox, E. F. Doyle and M. Hurwitz. Jul 64, 28p Dynatech 485
Contract AF33 615 1574, Projs. 8128, WRI11, Task 812808

Unclassified report

Descriptors: (*Superconductors, Generators), Electrical properties, Thermal properties, Magnetic properties, Electric connectors, Heat, Measurement, Test equipment, Cryogenics.

The general purpose of this contract is primarily applied research to demonstrate electrical, thermal and magnetic effects in a superconductor under conditions which will occur in superconductor generators. The work during the first quarter consisted primarily of designing experiments. Considerable thought was devoted to the difficult problem of measuring heat generation in superconductors under swept field conditions. Tests to measure thermal effects due to the leads which carry current from the cryogenic to the ambient region are described; and the apparatus to perform these tests was constructed and shakedown testing is underway. The design of other tests to demonstrate electrical output characteristics and also magnetic effects in superconductor stators are described. (Author)

AD-602 752 Div. 25, 30
OTS Prices: HC $1.00/MF $0.50

Laboratory of Astrophysics and Physical Meteorology, Johns Hopkins Univ., Baltimore, Md.
VACUUM ULTRAVIOLET GRATINGS.
Final rept.,
by Murk Bottema and John Strong. 30 Apr 64, 19p
Contract AF19 604 6139, Proj. 6687, Tasks 668801, 668802
AFCRL 64 398

Unclassified report

Descriptors: (*Diffraction gratings, Ultraviolet equipment), (*Ultraviolet equipment, Diffraction gratings), Vacuum apparatus, Optical equipment, Diamonds, Wear resistance, Glass, Aluminum, Platinum, Gold, Metal films, Electron microscopy.

The efforts to produce efficient diffraction gratings for the vacuum ultraviolet are reviewed, and data on 40 gratings ruled for the sponsor are given. The efforts have included studies of diamond wear; and experiences on ruling bare glass; aluminum, platinum, and gold films deposited on glass; and on both bare and coated glass rulings subsequently etched. Some of the ruling results have been photographed with an electron microscope. (Author)

AD-602 762 Div. 25, 2
OTS Prices: HC $3.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.

B; and (6) the occurrence of two magnetic field thresholds in a constantly increasing dB/dt. Some nonlinear properties of electron-hole plasmas appear to be unique: (1) the occurrence of several frequency modes as a function of B including three distinct types of transitions between these modes and (2) the relatively large self magnetic fields produced by the helical instability. (Author)

AD-602 683 Div. 25
OTS Prices: HC $3.00/MF $0.75

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
NON-EQUILIBRIUM ELECTRICAL CONDUCTIVITY IN A SEEDED PLASMA,
by E. E. Zukoski, T. A. Cool, and E. G. Gibson.
Apr 64, 67p
Contract AF49 638 1285
AFOSR 64 0848

Unclassified report

Descriptors: (*Plasma media, Electrical conductance), Argon, Impurities, Potassium, Vapors, Electric fields, Gas ionization, Relaxation time, Light, Intensity, Magnetohydrodynamics, Mathematical models.

Measurements of conductivity were made in a plasma composed of argon seeded with potassium vapor. The gas temperature was 2000K; the pressure, one atmosphere; the potassium concentration was between 0.22 and 0.80 mole per cent; and the current density was between 1 and 80 amp/sq cm. Conductivity values were calculated from a two-temperature model in which the energy dependence of the cross sections and radiation losses from the plasma are taken into account. The theoretical and experimental values are in excellent agreement. (Author)

AD-602 706 Div. 25
OTS Prices: HC $2.00/MF $0.50

Technical Operations, Inc., Burlington, Mass.
THE EFFECTS OF SPRAY PARTICLES FROM THE PENETRATION OF THIN TARGETS BY HYPERVELOCITY PARTICLES.
Final rept.
by R. W. O'Neil and V. E. Scherrer. 20 Mar 64, 36p
Contract AF33 657 10615, Proj. 3145, Task 314507
APL TDR64 60

Unclassified report

Descriptors: (*Hypervelocity projectiles, Test equipment), (*Terminal ballistics, Sprays), Velocity, Measurement, Cratering, Aluminum, Beryllium, Niobium, Test methods, Particles, Plasma medium, Experimental data, Cameras, Photographic equipment, Optical equipment, Penetration.

When a thin bumper target is impacted by a hypervelocity particle, a spray of particles is produced. Data are presented on the penetration of these spray particles into a witness plate for various bumper and witness plate materials, spacings, and bumper thicknesses. The exploding-foil projection technique and associated diagnostics are also described. (Author)

AD-602 713 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Notre Dame Univ., Ind.
RESEARCH ON THE PRODUCTION AND PHYSICS OF SINGLE CRYSTAL EMITTERS.
Final rept.,
by E. A. Coomes. 20 Apr 64, 32p
Contract AF19 604 8434, Proj. 6694, Task 669409
AFCRL 64 410

Unclassified report

Descriptors: (*Thermionic converters, Single crystals), (*Single crystals, Thermionic emission), (*Molybdenum, Thermonic emission), (*Tungsten, Thermionic emission), Energy conversion, Filaments, Production, Crystal growth, Emissivity, Scattering, Work functions, Diodes (Electron tubes).

Single crystals of tungsten and molybdenum from 1-10 cm long were produced by the Robison-plus-torsion technique in 4-5 mil filaments. These were studied in an improved electron projection diode, in which point-by-point and average thermionic constants could be measured on the same filament. The work functions for various directions of single crystal molybdenum were found to be the same as those for single crystal tungsten. Also the average values of work function phi sub R and A sub R were 4.40 and 40 respectively, for both tungsten and molybdenum. Thermal treatment always developed facets on the crystal areas of high work function. These facets had highest thermal stability when a shingled structure developed on them during heating. (Author)

AD-602 714 Div. 25, 20
OTS Prices: HC $1.00/MF $0.50

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SPECTROSCOPY OF A SUPERSONIC PLASMA. I. EXCITATION MECHANISM,
by LeRoy E. Brewer. Jul 64, 18p
Proj. RW2927, Task 895107
AEDC TDR64 151

Unclassified report

Descriptors: (*Plasma jets, Spectroscopy), Supersonic flow, Plasma physics, Atoms, Atomic energy levels, Excitation, Argon, Statistical functions, Line spectrum, Equations.

Spectral line emission has been shown to be strongly influenced by the existence of metastable states in plasmas. The distribution function for excited electronic states in a plasma in which an excess over equilibrium density of metastable atoms is present is derived by the establishment of a suitable model. This is accomplished by considering two different atoms which are identical except for their ground states. A Boltzmann distribution function is written for each type of atom for the upper energy states, and the two distributions are summed to obtain the population of the nth state due to both the normal and metastable atoms. Argon was used as an example for calculations which show that the population of a given excited state may be several orders of magnitude greater than that which would be expected if metastable atoms were not present. When including this new term in the Einstein-Boltzmann spectral line intensity equation, it is seen that intensities are considerably altered when even a slight excess concentration of metastable atoms is present. Experimental evidence in support of the form of the equation is presented. (Author)

AD-602 723 Div. 25
OTS Prices: HC $2.00/MF $0.50

Rhode Island Univ., Kingston.
SURFACE WAVES IN A FLUID-SOLID INTERFACE NEAR A DISCONTINUITY.
Technical rept. no. 5,

CALCULATION OF THE D-C ELECTRICAL CONDUCTIVITY OF EQUILIBRIUM NITROGEN AND ARGON PLASMA WITH AND WITHOUT ALKALI METAL SEED,
by R. E. Weber and K. E. Tempelmeyer.
Jul 64, 70p
Contract AF40 600 1000, Proj. 7778, Task 777805
AEDC TDR64 119

Unclassified report

Descriptors: (*Plasma media, Electrical conductance), Nitrogen, Argon, Gas ionization, Impurities, Cesium, Potassium, Sodium, Magnetic fields, Direct current, Magnetohydrodynamics.

Scalar electrical conductivities were computed for nitrogen and argon plasma in thermal equilibrium. Calculations were made for these gases both unseeded and seeded with cesium, potassium, and NaK in amounts ranging from 0.01 to 10 per cent seed by weight, and cover a range of pressure and temperature from 0.10 to 10,000 atm and from 2000 to 15,000K, respectively. Calculated electrical conductivities are presented in figure form as a function of temperature with seed rate and pressure as parameters. Some effects of applied magnetic fields up to 20,000 gauss on the conductivity of potassium-seeded nitrogen are also given. (Author)

AD-602 864 Div. 25
OTS Prices: HC $1.00/MF $0.50

Honeywell Research Center, Hopkins, Minn.
THE MECHANICAL AND MICROMECHANICAL PROPERTIES OF BORON.
Interim rept. no. 3, 1 May-30 Jun 64,
by C. J. Speerschneider and J. A. Sartell.
14 Jul 64, 14p
Contract NOw64 0159f

Unclassified report

Descriptors: (*Boron, Mechanical properties), (*Single crystals, Boron), Crystals, Symmetry (Crystallography), Anisotropy, Thermal expansion, Fracture (Mechanics), Grain boundaries.

The orientation of a boron 'single' crystal rod was determined by the Laue back reflection technique. Using a Netzsch dilatometer the coefficient of thermal expansion was found for room temperature to 1050C for both single, <111>, and polycrystals. In addition, studies of the fracture characteristics of boron were continued. (Author)

AD-602 866 Div. 25, 4
OTS Prices: HC $7.00/MF $1.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
EQUILIBRIUM OCCUPATION NUMBERS AND SPECIES CONCENTRATIONS FOR AIR, NITROGEN, AND OXYGEN TO 24,000K.
Technical rept.,
by B. H. Armstrong and M. Scheibe. Jun 64, 321p
LMSC 6 74 64 33

Unclassified report

Rept. on Physics.

Descriptors: (*Air, Atomic energy levels), (*Nitrogen, Atomic energy levels), (*Oxygen, Atomic energy levels), Gas ionization, Thermodynamics, Atomic properties, Atomic orbitals, Molecular properties.

Calculations of the compositions of air, nitrogen, and oxygen were carried out to supplement the results given by F. R. Gilmore in RM-1543. Occupation numbers for atomic states in pure nitrogen and oxygen are given in 1,000K intervals for the temperature range from 10,000K to 24,000K. Species concentrations of air constituents are tabulated over this temperature range. Tables of occupation numbers for the atomic and molecular states of pure nitrogen and oxygen, computed by F. R. Gilmore but unpublished, which cover the range from 3,000K to 10,000K are also included. (Author)

AD-602 870 Div. 25, 15
OTS Prices: HC $5.00/MF $1.00

Allison Div., General Motors Corp., Indianapolis, Ind.
ANALYSIS OF SOLAR REFLECTORS. MATHEMATICAL THEORY AND METHODOLOGY FOR SIMULATION OF REAL REFLECTORS.
Final rept.
16 Dec 63, 167p EDR3693
Contract AF04 695 335

Unclassified report

A portion of this document is illegible or non-reproducible.

Descriptors: (*Reflectors, Mathematical models), (*Mathematical models, Reflectors), Solar radiation, Energy conversion, Optics, Surface area, Errors, Statistical distributions, Equations, Programming (Computers), Optical equipment, Simulation.

A mathematical model for analysis of actual solar reflectors is formulated. This model allows one to calculate the energy flux on any arbitrarily shaped focal surface from any arbitrarily shaped reflector surface. Provisions are included for treating random surface errors on the reflector surface, orientation errors of any size, and vignetting of reflected radiation by a cavity opening. No approximations have been introduced into this model. Operative computer programs for evaluating solar reflectors have been developed from these equations. Details concerning these programs are also presented. (Author)

AD-602 871 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Elcon Lab., Inc., Peabody, Mass.
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS.
Monthly rept. no. 10,
by Robert Siegel. 15 Apr 64, 5p ELI R-4-64-2
Contract AF33 657 11671

Unclassified report

Descriptors: (*Electromagnetic waves, Plasma physics), (*Plasma physics, Electromagnetic waves), Special functions (Mathematical), Diffusion, Pumping (Electronics), Electric fields, Transport properties, Elastic scattering, Conductivity, Electrons, Differential geometry.

The most important terms in the spherical harmonic expansion are the time and space dependent coefficients. Expressions for these functions have been derived with the following assumptions and the justifications for them. The sum and difference frequency terms being of second order were assumed negligible. In addition, the diffusion coefficients were equated to zero on the grounds that experimental data could be obtained prior to the onset of these effects yet after the pumping pulse. Other controllable experimental parameters were established. (Author)

AD-602 876 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

SATELLITE INFRARED BACKGROUND EXPERIMENT DATA ANALYSIS,
by H. W. Wessely. 15 Jun 64, 52p TDR-269 4710 29 1
Contract AF04 695 269
SSD TDR64 101

Unclassified report

Descriptors: (*Scientific satellites, Infrared research), (*Infrared research, Scientific satellites), Radiometers, Infrared radiation, Background, Atmosphere, Optical properties, Experimental data, Statistical analysis, Geophysics.

The results of a statistical analysis of background data obtained with a satellite borne radiometer operating in the 1.4, 1.8, 2.2, and 2.7 micron spectral regions are presented. The insolation angle is considered as a fundamental parameter of the background, and all statistical distributions are accordingly referred to a specific insolation angle. Distributions of the absolute radiance and local radiance difference are presented. Joint probability amplitude distributions together with the derived linear correlation coefficients for certain spectral band pairs are also presented. (Author)

AD-602 781 Div. 25, 20
OTS Prices: HC $2.00/MF $0.50

Tem-Pres Research, Inc., State College, Pa.
SMALL ANGEL X-RAY SCATTERING: METHODS AND CONSIDERATIONS.
Technical rept. no. 3,
by John A. Williams and Bert Phillips. 15 Jun 64, 41p
Contract Nonr4089 00

Unclassified report

Prepared in cooperation with Pennsylvania State Univ., University Park.

Descriptors: (*X-rays, Coherent scattering), (*Coherent scattering, X-rays), Electron density, X-ray diffraction analysis, Scattering, Intensity, Experimental data, Collimators, Electromagnetic waves, Radiation measurement systems.

The purpose of this report is to discuss in a general manner the factors which must be considered in small angle x-ray scattering experimentation. It is intended primarily to assist those who wish to use this technique as an analytical tool, but who will not be greatly interested in mathematical and theoretical aspects. Various experimental considerations, such as collimation systems, monochromatization of the x-ray beam and detection of the scattered x-rays are described, especially with reference to the Kratky collimation arrangement. The effects of parasitic scattering and sample thickness on the results in a scattering investigation are indicated. (Author)

AD-602 792 Div. 25, 14, 27
OTS Prices: HC $3.00/MF $0.50

Mechanical Technology, Inc., Latham, N. Y.
EXPERIMENTAL STUDY OF ELASTOHYDRODYNAMIC LUBRICATION,
by F. K. Orcutt. 8 Jul 64, 56p MTI 64TR37
Contract Nonr3729 00FBM

Unclassified report

Descriptors: (*Lubrication, Hydrodynamics), Elasticity, Theory, Lubricants, Films, Thickness, Thermal properties, Viscosity, Loading (Mechanics), Pressure, Temperature, Test equipment, Disks.

The report describes direct experimental measurements of pressure distribution, surface temperature and film shape or deformation profile which were obtained during an investigation of elastohydrodynamic lubrication. These measurements illustrate effects of load, rolling speed, lubricant properties and sliding speed. Their purpose is to provide guidance and verification for the development of an elastohydrodynamic theory which can then be generally applied to practical problems in the manner which has been described. The results agree with the thermal-elastohydrodynamic theory of Cheng in many respects, but there are also differences which indicate that certain modifications in the formulation of the theory should be made. (Author)

AD-602 801 Div. 25
OTS Prices: HC $1.00/MF $0.50

Stanford Electronics Labs., Stanford Univ., Calif.
DEFECT STRUCTURES IN QUENCHED AND ANNEALED GaAs CRYSTALS,
by G. L. Pearson, H. R. Potts and V. G. Macres.
Jun 64, 18p SEL 64 069, TR5106 1
Contract DA31 124ARO D155, Proj. 20010501B700

Unclassified report

Descriptors: (*Crystal lattice defects, Measurement), (*Gallium alloys, Arsenic alloys), Single crystals, Heat treatment, Quenching (Cooling), Diffraction analysis, Crystal lattices, Enthalpy.

Lattice parameter measurements have been made by the Kossel-line technique on quenched gallium arsenide crystals. Samples quenched from temperatures above 1000C showed an increase in lattice parameter. The change with temperature has an enthalpy of 2.0 ev and is attributed to the formation of vacancies. Room-temperature annealing of the defects is also shown, and is seen to proceed in several stages. (Author)

AD-602 811 Div. 25, 7
OTS Prices: HC $3.00/MF $0.50

MHD Research, Inc., Newport Beach, Calif.
EXPLOSIVE MAGNETOHYDRODYNAMICS.
Quarterly technical progress rept. no. 1, 1 Apr-30 Jun 64,
by Malcolm S. Jones, Jr. and Francis H. Webb, Jr.
13 Jul 64, 56p MHD 655
Contract AF33 615 1594, Proj. 8173, Task 817306

Unclassified report

Descriptors: (*Magnetohydrodynamics, Generators), (*Electric power production, Magnetohydrodynamics), Energy conversion, Electromagnetic pulses, Explosions, Plasma media, Cesium, Shock waves, Loading (Mechanics), Probes (Electromagnetic), Circuits, Theory.

Experimental and theoretical studies on the production of high energy, short duration pulses of electrical power by MHD principles are discussed. Previous work in a 1 inch by 1 inch cross section channel and a 1 inch by 4 inch cross section channel using cesium seeded condensed explosives, which produced tens of megawatts of electrical power in pulses of approximately 100 micro sec, is expanded. A program for a 2 inch by 6 inch cross section linear channel and for a radial geometry generator is discussed. Power generation appears to be proportional to the square of the velocity of the conducting front. Lumped parameter circuit theory analyses are presented and expressions derived which may be used to determine the amount of energy removed from the slug as a function of distance along the channel and the generator geometry. (Author)

AD-602 858 Div. 25
OTS Prices: HC $3.00/MF $0.75

Arnold Engineering Development Center, Arnold Air Force Sation, Tenn.

Descriptors: (*Infrared radiation, Absorption), Gases, Air, Optical properties, Humidity, Optical instruments, Crystals, Light transmission, USSR.

An installation is described for the investigation of the absorption of infrared rays in gases. Experimental data are presented on the influence of distance and humidity on the transparency of small thicknesses of room air for several regions of wave lengths in an interval from 15 to 200 microns. (Author)

AD-602 902 Div. 25, 2
OTS Prices: HC $2.00/MF $0.50

Wayne State Univ., Detroit, Mich.
THEORETICAL INVESTIGATIONS ON THE LIGHT SCATTERING OF SPHERES. XVI. RANGE OF PRACTICAL VALIDITY OF THE RAYLEIGH THEORY.
Technical rept. no. 9 55,
by Wilfried Heller. 14 July 64, 32p
Contract Nonr3511 00, Proj. NR051 380
Unclassified report

Descriptors: (*Light, Scattering), Optical phenomena, Theory, Errors, Numerical analysis, Particle size, Spheres, Meteorology, Astronomy.

The errors committed on using the Rayleigh equations of light scattering at finite alpha-values were evaluated numerically for spherical nonabsorbing particles using exact Mie-data as the reference. Considering an error of 2% as the tolerable maximum, the upper limiting particle diameters which may be evaluated by means of the Rayleigh equations are, expressed in units relative to the wave length (in the medium) used, 0.124and0.207 at m = 1.00 and 1.30 respectively. The errors committed on evaluating turbidity or lateral scattering from the Rayleigh equations are distinctly larger at identical true alpha-values, and at identical m-values. The interesting fact that the Rayleigh equations perform better the larger m-as long as m < approx. 1.8-opens up the possibility of using these equations for the evaluation of relative large particle diameters provided m is sufficiently large. This 'second' range of validity of the Rayleigh theory appears to be of major meteorological and astrophysical interest. (Author)

AD-602 909 Div. 25
OTS Prices: HC $2.00/MF $0.50

Purdue Univ. Lafayette, Ind. School of Aeronautical and Engineering Sciences.
STRESS WAVE PROPAGATION IN FINITE VISCOELASTIC THIN ROD WITH A CONSTITUTIVE LAW OF THE HEREDITARY TYPE.
by K. C. Valanis and S. Chang. Jan 64, 34p
A and ES 64 2
Contract AF94 611 8539, Proj. 3480
Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Stresses, Propagation), Viscoelasticity, Velocity, Differential equations, Theorems, Functions, Creep, Time, Strain (Mechanics), Polyethylene plastics, Rods.

The paper is concerened with stress wave propagation in a finite viscoelastic rod made of material which obeys a constitutive law of a general hereditary type. The method of perturbation about a Maxwell body solution, which was used to analyse the wave propagation in a semi-infinite rod, is extended to deal with reflections of stress fronts at both ends of the rod. A numerical illustration of propagation of stress discontinuities in a finite rod made of Polyisobutylene is included. (Author)

AD-602 911 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

Western Reserve Univ., Cleveland, Ohio.
THEORY OF THE MANY-BODY BOSE SYSTEM.
Final rept. for 16 Jun 59-30 Jun 63,
by P. R. Zilsel. 15 Jan 64, 11p
Contract DA33 019ORD3003; Grant DA ORD40,
Proj. 5B99 01 004 and 2430
AROD 2813:4
Unclassified report

Descriptors: (*N-body problem, Bosons), (*Bosons, N-body problems), Field theory, Perturbation theory, Hamiltoian, Hydrodynamics, Helium, Liquefied gases, Excitation, Calculus of variations, Fluids, Temperature.

The purpose of the work was to study the collective elementary excitations, as well as the ground state properties, of the non-relativistic many-body system of bosons interacting with short range forces. The ultimate aim is the theory of superfluid helium, and the work therefore was concerned with avoiding the limitations to low density and/or weak forces which characterize the Bogoliubov theory of the non-ideal Bose gas and those treatments which derive from it. In contrast to the fermion case, where the statistics tend to suppress the many-particle correlation effects of short range forces, there is in the boson case no reason to suppose that a free particle or pair approximation provides an adequate starting point for a perturbation precedure, except in the low density limit. The basic approach, therefore, was to explore the use of field theoretic representations which include from the start at least some collective many-body effects of the strong short-range interaction. (Author)

AD-602 913 Div. 25
OTS Prices: HC $1.00/MF $0.50

Temple Univ., Philadelphia, Pa.
THE APPLICATION OF P.W. BRIDGMAN'S 'NEW EMF' TO EXPLODING WIRE PHENOMENA,
by Kenneth G. Moses and Theodore Korneff.
1964, 14p
Contract AF19 628 215
Unclassified report

Based on Doctoral thesis to be submitted by K. G. Moses.

Descriptors: (*Exploding wires, Electrical properties), Voltage, Thermodynamics, Wire, Melting, Vaporization, Energy, Hall effect, Capacitors.

P.W. Bridgman propounded the possible existence of a 'New emf' generated in a conductor carrying a current due to a time varying temperature. This emf was not detected by any researchers due to the fact that the magnitude of this generated voltage is very small under normal conditions. However, under the conditions of an exploding wire the magnitude of the emf can become increasingly important. It is shown that this effect can possibly account for the excess energy required to melt and vaporize a wire under the extreme conditions of a rapid discharge. (Author)

AD-602 919 Div. 25
OTS Prices: HC $2.00/MF $0.50

New Mexico State Univ., University Park,
ANISOTROPIC LIGHT SCATTERING BY INNER FIELD FLUCTUATIONS IN A DENSE MONATOMIC GAS,
by O. Theimer and R. Paul. 1964, 29p
Unclassified report

Work supported in part by the Office of Naval Research.

NOTES ON THE DYNAMICS OF CARDAN SUSPENSION,
by D. M. Klimov. 14 Jul 64, 8p
FTD TT64 416, TT 64 71130

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya: Mekhanika i Mashinostroenie, 1963, no. 4, p. 7-9.

Descriptors: (*Gyroscopes, Motion), Drift, Oscillation, Moments, Force (Mechanics), Moment of inertia, Dynamics, Equations, Numerical analysis, USSR.

Previously, the cause of free gyroscopic drift in a Cardan suspension during nutational oscillation was assumed to be the constant component of the projection of the moment of forces of the reaction in the fulcrums of the outer-ring axis on the mean direction of the axis of rotation of the inner ring. Moreover, it is well known that the motion of the gyroscopic axis is caused by the action forces of the inner ring on the rotor. Calculations carried out here show that the moment of forces of the action of the inner ring on the rotor and the moment of forces of the reactions of the base on the outer ring have different projections on the the mean direction of the inner-ring axis. Here, it is proved that the constant components of these projections are mutually equal. Therefore, inaccurate mechanical arguments in certain problems yield an accurate result. (Author)

AD-602 878 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF THE SECONDARY ION EMISSION DURING THE BOMBARDMENT OF METALS BY LOW-ENERGY IONS.
by D. D. Gruich, N. Rakhimbaeva, G. Ikramov, and T. Arifov. 14 Jul 64, 15p
FTD TT64 544, TT 64 71132

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Uzbekskoi SSR Tashkent. Izvestiya. Seriya Fiziko-Matematicheskikh Nauk, 1964 v. 8 no. 1, p. 53-60.

Descriptors: (*Secondary emission, Ion bombardment), (*Ion bombardment, Secondary emission), Ion beams, Energy, Tantalum, Tungsten, Nickel, Sodium, Molybdenum, Potassium, Cesium, Rubidium, Barium, Halides, Elastic scattering, Ionization, USSR, Laboratory equipment.

AD-602 880 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOME CHARACTERISTICS OF A PLASMA PENETRATING BEYOND THE LIMITS OF THE DISCHARGE SPACE,
by G. V. Krivoshchekov and I. N. Kalistratova.
14 Jul 64, 7p
FTD TT64 587, TT 64 71134

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Sibirskoe Otdelenie. Izvestiya, 1963, no. 6, Seriya Tekhnicheskikh Nauk, no. 2, p. 121-123.

Descriptors: (*Gas discharges, Plasma physics), (*Plasma medium, Penetration), Electron beams, Ion beams, Electrodes, Argon, Electron tubes, Superhigh frequency, USSR.

When studying the characteristics of a low-voltage, arc discharge in mercury vapors the phenomenon of the propagation of the plasma beyond the limits of the discharge anode was detected; whereupon, by introducing additional acceleration, the conditions of propagation could be varied. The paper gives the results of a study which make this process and its characteristics more accurate for the use of this phenomenon during the formation of an electron flow in superhigh-frequency instruments with ion focusing. (Author)

AD-602 881 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BIPOLAR FLOW IN A SPECIAL MAGNETIC FIELD,
by V. N. Danilov. 14 Jul 64, 16p
FTD TT64 619, TT 64 71135

Unclassified report

Unedited rough draft trans. of Fiziko-Tekhnicheskii Institut, Moscow. [Trudy] (USSR) 1962, v. 10, p. 67-79.

Descriptors: (*Ionic currents, Space charges), (*Plasma physics, Magnetic fields), Plasma medium, Electrons, Ion beams, Ion accelerators, Magnetrons, USSR.

It is shown that, in a magnetic field, the effective compensation of the space charge of an ion flow by electrons can occur. By selecting the appropriate magnetic fields, one can achieve as high a reciprocal compensation of the electron and ion space charges as desired. (Author)

AD-602 886 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

Aeronautical Research Associates of Princeton, Inc., N. J.
ENERGY AND MOMENTUM EXCHANGE BETWEEN NON-EQUIPARTITION GASES,
by T. F. Morse. Feb 63, 36p ARAP 45
Contract Nonr362300

Unclassified report

Rept. on Proj. Squid.

Descriptors: (*Kinetic threory, Gases), (*Plasma media, Relaxation time), Momentum, Energy, Magnetohydrodynamics, Molecules, Ions, Electrons, Diffusion, Integral equations, Partial differential equations, Mathematical models, Thermodynamics.

The energy and momentum relaxation of the components of a non-equipartition gas mixture is considered. For the case where each component of the mixture has a Maxwellian distribuation at a particular temperature, with the peculiar velocity in the Maxwellian measured relative to the species diffusion velocity, and a 'diffusion' Mach number not too large, the results have a particularly simple form. The calculations were carried out for the hard sphere, Coulomb, and Maxwell force laws of interaction. It is also noted how these results may be used to construct approximate kinetic model equations for the case of hard sphere and Coulomb interaction, in a manner similar to that proposed by Sirovich. (Author)

AD-602 896 Div. 25, 2
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TRANSPARENCY OF GASES IN THE INFRARED PART OF THE SPECTRUM FOR SMALL DISTANCES,
by B. P. Kozyrev and A. V. Mezenov. 13 May 64, 9p
FTD TT64 41, TT 64 71137

Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Fizika (USSR) 1963, no. 3, p. 18-22.

with particular reference to EuO, EuS, EuSe and EuTe. Curie temperatures, magnetization curves for general values of the applied field, susceptibility, spin correlation functions, energy, and specific heat curves are calculated. To explore the sensitivity of the theory to the exchange constants the results of the cluster approximation are given for various ratios of the first and second neighbor exchange constants, including the special case of vanishing second neighbor exchange (in this latter case the approximation generalizes the constant coupling approximation to arbitrary spin). All the presently measured magnetic properties are rather insensitive to the particular choice of exchange constants provided that these are chosen to be consistent with the observed Curie temperature; measurement of the spin correlation functions, however, would provide a sensitive criterion for the choice of exchange constants. (Author)

AD-602 960 Div. 25, 15
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
COMPARISON OF FOKKER-PLANCK AND BHATNAGAR-GROSS-KROOK EQUATIONS,
by M. S. Grewal. 5 Jun 64, 26p TDR269 4280 30 2
Contract AF04 695 269
SSD TDR64 115

Unclassified report

Descriptors: (*Partial differential equations, Analysis), Stochastic processes, Probability, Equations, Motion, Plasma physics, Electron density, Transport properties, Time interval counters, Integral transforms, Perturbation theory, Quantum mechanics.

A Fokker-Planck Equation, such as the one used in the theory of Brownian motion, and the Bhatnagar-Gross-Krook equation that conserves only number density are compared via their transition probabilities. These two equations have been used in various problems arising in the study of plasmas. It is shown that for time intervals large compared with the average collision time both equations give the same results. For the opposite limit of times small compared with the collision time, the disparity between the two equations increases as the initial velocity of the test particle increases; however, the difference between the two transition probabilities is shown to be reduced if the initial velocity distribution is Maxwellian. (Author)

AD-602 967 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Microwave Lab., Stanford Univ., Calif.
MICROWAVE RESEARCH.
Quarterly status rept. no. 21, 1 Feb-30 Apr 64.
Jul 64, 17p ML 1192
Contract Nonr225 48, Proj. NR373 361

Unclassified report

Descriptors: (*Microwaves, Scientific research), (*Acoustic equipment, Amplifiers), (*Lasers, Optical properties), (*Ferrites, Wave transmission), Sound, Piezoelectric crystals, Microwave amplifiers, Propagation, Hypersonic flow, Light, Diffraction, Particles, Plasma oscillation, Nonlinear systems.

Research progress in the following fields is summarized: acoustic wave amplification; optical masers; ferrite nonlinear propagation; diffraction of light waves by hypersound; forces on neutral particles in light beams.

AD-602 968 Div. 25
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
ELECTRIC SUSCEPTIBILITY CONTRIBUTION TO VERDET'S CONSTANT OF ATOMIC HYDROGEN,
by Jack Finkel. 5 May 64, 12p
Proj. FR48
NOL TR64 87

Unclassified report

Descriptors: (*Hydrogen, Quantum mechanics), (*Atomic spectroscopy, Hydrogen), Electrical properties, Magnetic properties, Electrons, Spin, Atomic energy levels, Polarization, Magneto-optic effect.

The electric susceptibility contribution to Verdet's constant of atomic hydrogen V(e) is derived for Zeeman splittings that are much smaller than the fine structure splitting but greater than the hyperfine splitting. Neglect of the electron spin in this calculation would result in a value for V(e) which is 18.2% low. The contribution to V(e) from continuous states is 6.8% of the contribution from the descrete states, at a wavelength of 6000A. The total Verdet constant at 6000A, including the magnetic susceptibility contribution, for 2.69 x 10 to the 19th power atoms per cu. cm is 10.8 micro-min. per cm per oersted. The experimental value of Verdet's constant of molecular hydrogen under these conditions is 5.82 micro-min. per cm per oersted. This difference in Verdet's constant between atomic and molecular hydrogen can be used to determine the atomic concentration in a mixture. (Author)

AD-602 970 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Chalmers Univ. of Tech., Gothenburg (Sweden).
DYNAMIC NON-LINEAR WAVE PROPAGATION IN IONIZED MEDIA. 15. CERENKOV EFFECT IN A PRE-OSCILLATING MEDIUM.
by K. H. B. Wilhelmsson and A. R. Thomasson.
1 Apr 64, 22p CUT RR46, CUT US40
Contract AF61 052 451
AFCRL 64 534

Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Cerenkov radiation, Electrons), Field theory, Dynamics, Nonlinear systems, Plasma physics, Plasma oscillation, Gas ionization, Dielectrics, Quantum mechanics, Vector analysis, Special functions (Mathematical), Differential geometry.

The purpose of the present investigation was to show that for a pre-oscillating medium, i.e. a medium that oscillates in time and space even in the absence of a Cerenkov electron, side-bands of the original Cerenkov radiation spectrum will be generated and to determine the characteristics of the associated waves. Utilization was made of classical electrodynamics to solve the problem and express the disturbance in the medium by a propagating term in the dielectric constant describing the medium macroscopically.

AD-602 972 Div. 25
OTS Prices: HC $1.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
DIRECTORS AND MULTIPOLAR DISPLACEMENTS IN CONTINUUM MECHANICS,
by A. E. Green, P. M. Naghdi, and R. S. Rivlin.
Jun 64, 17p AM64 9
Contract Nonr222 81, Proj. NR064 449

Unclassified report

Prepared in cooperation with Brown Univ., Contract Nonr562 10.

Descriptors: (*Continuum mechanics, Theory), Dynamics,

Descriptors: (*Light, Scattering), Gases, Optical properties, Polarization, Intensity, Atomic properties, Particles, Density, Iterative methods, Integral equations, Differential equations.

The intensity of light scattering by monatomic gases is calculated by a new method which is particularly suited to analyzing the effect of collective phenomena such as the fluctuations of the inner field. The Fourier coefficients of the polarizability density are used as stochastic variables and their relation to the atomic form factor and the particle density is established. The effective inner field for a specific particle configuration is obtained as an iterative solution of an integro-differential equation, and is used for calculating the scattering intensity. This intensity is then averaged over all particle configurations. At ordinary pressures Rayleigh's scattering formula is confirmed, but at high pressures observable corrections to his formula are obtained. In particular, scattering is found depolarized contrary to Rayleigh's theory and to some recent work. (Author)

AD-602 926 Div. 25
OTS Prices: HC $3.00/MF $0.75

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
THE CONVOLUTION MOLECULE METHOD AND ITS APPLICATION TO CRYSTAL STRUCTURE ANALYSIS.
by Georg Will. Mar 64, 85p
Task DA1A0 10501B010
AELRDL TR2436

Unclassified report

Descriptors: (*Crystal substructure, Analysis), Symmetry (Crystallography), Crystal lattices, Molecular properties, X-ray diffraction analysis, Integral transforms.

Convolution molecules are molecular Patterson diagrams. Inserted in the unit cell properly, as described by the convolution molecular structure, they allow deconvolution of a Patterson diagram, leading to orientational and translational parameters of the molecules. The convolution molecule structures are derived by a new method and are tabulated for all space groups of triclinic, monoclinic and orthorhombic symmetry. (Author)

AD-602 946 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh, Pa.
ELECTRONIC SPECIFIC HEAT AND SATURATION MAGNETIZATION OF Cr-Fe AND Fe-Co ALLOYS.
Technical rept. no. 24,
by L. Berger. 15 Jul 64, 48p
Contract Nonr760 05, Proj. NR018 301

Unclassified report

Work supported in part by the National Science Foundation.

Descriptors: (*Ferromagnetic materials, Alloys), (*Alloys, Ferromagnetism), Low temperature research, Specific heat, Electrons, Spin, Transition elements, Model theory, Atomic structure, Chomium alloys, Iron alloys, Cobalt alloys, Solid state physics.

The collective model of ferromagnetism is applied to various models for the upper third of the 3d band profile of bcc alloys of transition metals. In the first band profile, we consider a rectangular sub-band with rounded lower and upper edges, assuming an intra-atomic exchange integral just large enough to produce ferromagnetism. The low-temperature specific heat coefficient is found to have a sharp peak at the electron concentration where ferromagnetism starts (almost empty sub-band), and a deep minimum at the concentration with largest saturation magnetization (half-filled sub-band). This agrees qualitatively with the measurements by Cheng, Wei, and Beck in Cr-Fe and Fe-Co alloys. The agreement becomes quantitative if a second, similar, model of the band profile is used where the density of states inside the sub-band is not constant but drops linearly with increasing energy. The calculated zero-temperature saturation magnetizations agree well with the Slater-Pauling curve for these alloys. (Author)

AD-602 952 Div. 25, 17
OTS Prices: HC $4.00/MF $0.75

Syracuse Univ., N. Y. Research Inst.
CRACK INITIATION IN CRYSTALLINE MATERIALS.
Interim technical rept. no. 1,
by P. Packman, K. Schroder, and V. Weiss. Jul 64,
125p MET 1160 0764IT
Contract NOw64 0275d

Unclassified report

Descriptors: (*Fracture (Mechanics), Crystals), (*Tungsten, Fracture (Mechanics)), (*Titanium alloys, Fracture (Mechanics)), (*Lithium compounds, Fluorides), Single crystals, Stresses, Continuum mechanics, Surface properties, Plasticity, Crystal lattice defects, Nucleation, Loading (Mechanics), Models (Simulations).

The influence of several macroscopic and microscopic parameters on the fracture of crystalline materials was studied on commercially pure tungsten, 2.5Al-16V titanium alloy and LiF single crystal specimens. Test results showed that the continuum mechanical maximum stress theory predicts the correct behavior of these materials when surface preparation techniques are identical. Microplasticity at the surface seems to influence the mode and stress for crack initiation and fracture. Bend test results on LiF showed that small cleavage cracks at the surface are not necessarily responsible for crack initiation. The actual dislocation process occuring at or near the surface was strongly dependent on the condition of the surface. Based on the equations of Neuber, the position of the maximum stress for an elliptical crack inclined at an arbitrary angle to the applied load was calculated. (Author)

AD-602 954 Div. 25
OTS Prices: HC $2.00/MF $0.50

Pennsylvania Univ., Philadelphia.
CLUSTER APPROXIMATION FOR FERROMAGNETS WITH FIRST AND SECOND NEIGHBOR EXCHANGE, WITH APPLICATION TO THE EUROPIUM CHALCOGENIDES.
Technical rept. no. 16,
by Herbert B. Callen and Earl Callen. Jun 64, 39p
Contract Nonr551 36

Unclassified report

Descriptors: (*Ferromagnetic materials, Field theory), (*Europium compounds, Chalcogens), (*Chalcogens, Europium compounds), Magnetic properties, Oxides, Sulfides, Selenides, Tellurides, Paramagnetic materials, Specific heat, Spin, Energy, Temperature, Mathematical analysis.

The two-particle cluster approximation of Strieb, Callen and Horwitz is extended to ferromagnets and paramagnets with nearest and next-nearest neighbor exchange,

26. Production and Management

AD-602 319 Div. 26, 7, 9, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHOD OF OBTAINING HIGH AND SUPERHIGH PRESSURES,
by L. A. Yutkin and L. I. Gol'tsova. 10 Jun 64, 6p
FTD TT63 1043; TT 64 11854

Unclassified report

Unedited rough draft trans. of Russian patent 148724, appl. 605993/25, 25 Mar 51, p. 1-2.

Descriptors: (*High-pressure research, Electromechanical converters), (*Electromechanical converters, High-pressure research), Electric discharges, Gases, Compressive properties, Hydraulic systems, Pneumatic systems, USSR.

The distinguishing peculiarity of the method described consists in the accomplishing of electrical discharges or heat explosions of heat conducting elements in a medium of gas or vapor with the compression of the plasma of the discharge or the accomplishing of it in a narrow channel or accumulating chamber. The use of this method makes it possible to apply lighter electrohydraulic impacts to the material being processed. High pressure of a gaseous medium can be used for different mechanical, physical, or chemical treatment of materials, and also for the displacement of objects and other actions.

AD-602 367 Div. 26
OTS Prices: HC $1.00/MF $0.50

Hexcel Products, Inc., Berkeley, Calif.
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
Progress rept. no. 4,
by M. N. Bandak. 13 May 64, 24p
Contract DA04 200AMC477A, Proj. 6065

Unclassified report

Descriptors: (*Honeycomb cores, Aluminum alloys), (*Cylindrical bodies, Design), Sandwich construction, Energy, Deceleration, Acceleration, Embedding substances, Stiffened cylinders, Thickness, Tolerances (Mechanics), Reinforcing materials, Containers, Sheets.

The test plan was revised to delete the temperature-shock, temperature and humidity, and altitude tests from the Phase I testing and an edge drop test was added. After drop testing was completed, the end caps were removed and the potting in the ends of the energy absorption cylinder was cut out. Two additional flat drop tests from 36 inches were then performed, the first at a position of 90 degrees from the positions originally tested and the second at 180 degrees from the first. For the second test, the outer skin was removed. The first test resulted in a peak deceleration of 61.5g's and an average deceleration of 45g's. The second test, with both potting and skin removed, resulted in a peak deceleration of 41g's. (Author)

AD-602 460 Div. 26, 9
OTS Prices: HC $2.00/MF $0.50

Ampex Corp., Redwood City, Calif.
AXISYMMETRICAL FOIL BEARING, COMPRESSIBLE FLOW,
by E. Barlow. Jun 64, 38p Ampex RR64 6
Contract Nonr3815 00, Proj. NRO62 297

Unclassified report

Descriptors: (*Gas bearings, Fluid dynamic properties), (*Compressible flow, Numerical analysis), Bearings, Foils Axially symmetric flow, one-dimensional flow, Boundary value problems, Nonlinear differential equations, Integration.

The axisymmetrical foil bearing was studied along with effects of compressibility. The pressure and gap profiles were found by numerically integrating the governing equations. The results were compared with the corresponding results obtained in a previous report on an approximate solution of the same problem assuming incompressible flow. (Author)

AD-602 483 Div. 26, 17
OTS Prices: HC $2.00/MF $0.50

Republic Aviation Corp., Farmingdale, N. Y.
ELECTRO-SPARK EXTRUDING.
Interim technical engineering rept. no. 4, 1 Apr-1 Jul 64,
by J. H. Wagner. Jul 64, 30p RAC 2491
Contract AF33 657 11265, Proj. 8 111
ASD TR8 111 V4

Unclassified report

Descriptors: (*Extrusion, Metals), Pressure vessels, Design, Dies, Sparks, Shock waves, Capacitors, Pumps, Electric discharges, Hydraulic fluids, Safety, High pressure research, Design, Steel, Electrodes, Explosive forming, Manufacturing methods.

General design criteria consisting of working pressure, pressure source, shock loading and preliminary specifications of a pressure vessel to perform capacitor discharge extrusion from a 200,000 psi fluid pressure are discussed. Design criteria for the container, liner, insert and die assembly components are presented. A pumping system to obtain pressures to 200,000 psi with inhibited water is described. Fluids for use at pressures from 0 to 200,000 psi are proposed. Shielding of equipment and other safety considerations in working with ultra-high pressures are outlined. (Author)

AD-602 558 Div. 26
OTS Prices: HC $4.00/MF $0.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DEVELOPMENT OF INDIVIDUAL MACHINE CONSTRUCTION BRANCHES,
by A. G. Omarovskii. 1 Oct 63, 126p
FTD MT63 61; TT 64 11926

Unclassified report

Edited machine trans. of mono. Razvitie i Razmeshchenie Mashinostroeniya v SSSR (Development and Distribution of the Machine Construction in the USSR) Moscow, 1962, chap. 4, p. 62-81.

Descriptors: (*Machine tool industry, USSR), Machine tools, Industrial equipment, Metallurgy, Industrial plants, Mechanical engineering, Production, Economics, Automation, Automotive industry, Electrical industry, Agriculture, Transportation, Factories, Electronic equipment, Machine shop practice.

AD-602 643 Div. 26, 14, 17
OTS Prices: HC $3.00/MF $0.50

SKF Industries, Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Progress rept. no. 10, 22 Dec 63-22 Mar 64,
by E. F. Brady. 22 Mar 64, 53p, AL64T037
Contract NOw61 0716C

Unclassified report

Field theory, Mechanics, Elasticity, Tensor analysis, Vector analysis, Equations, Motion.

A general theory of multipolar continuum mechanics has been developed by Green and Rivlin (1964b) based on multipolar displacements. A new definition of multipolar displacements is given here and the place of directors in this theory is identified. The dynamical theory of displacements, directors and dipolar displacements corresponding to the present definitions is outlined and this contains Ericksen's (1961) theory of liquid crystals as a special case. Explicit constitutive equations are obtained for an elastic continuum under the action of ordinary displacements and directors. (Author)

have platen widths from 31 to 202 inches and depths from 22 to 241 inches, produce upset forces from .9 to 13 million pounds, and have electrical demands from 5 to 39 megavolt-amperes. Locations of twenty-three power systems capable of meeting the maximum demand of one machine at selected points were shown and methods of reducing demand to permit further freedom of location were presented. Trial welds in four aluminum armor alloys (2219-T87, 5083-H113, 6061-T6, and 7039-T6) were reviewed. Study of motion records, examination of one weld, and strength tests of all showed that these flash welds exceed fusion welds in tensile strength and that production flash welds should exceed ninety percent joint efficiency. (Author)

AD-602 937 Div. 26, 8, 25
OTS Prices: HC $7.36/MF $2.00

Texas Instruments, Inc., Dallas.
QUALITY CONTROL MANUAL INSPECTION PROCEDURES FOR SILICON NPN GROWN JUNCTION DEVICE TYPE 2N333.
Rept. on Item 9.
15 Aug 63, rev., 436p MPQRA 103
Contract DA36 039SC86730 Unclassified report

Descriptors: (*Semiconductor devices, Quality control), (*Quality control, Semiconductor devices), (*Silicon, Semiconductor devices), Test methods, Test facilities, Packaging, Reliability (Electronics), Specifications, Standards, Crystal growth, Instruction manuals.

AD-602 938 Div. 26, 8, 25
OTS Prices: HC $6.00/MF $1.25

Texas Instruments, Inc., Dallas.
QUALITY CONTROL MANUAL INSPECTION PROCEDURES FOR SILICON NPN DIFFUSED MESA XP1714 (2N656).
Rept. on Item 4.
15 Aug 63, rev., 252p MPQRA-102
Contract DA36 039SC86730
Unclassified report

Descriptors: (*Semiconductor devices, Quality control), (*Quality control, Semiconductor devices), (*Silicon, Semiconductor devices), Test methods, Test facilities, Packaging, Reliability (Electronics), Specifications, Standards, Instruction manuals.

Descriptors: (*Roller bearings, Lubrication), (*Ball bearings, Lubrication), (*Lubrication, Roller bearings), Tracer studies, Electrical conductance, Friction, Wear resistance, Steel, Fatigue (Mechanics), Failure (Mechanics), Lubricants, Autoradiography, Velocity, Films, Test methods, Life expectancy.

Lubrication studies, using radiotracer techniques and electrical conductivity measurements developed previously have been continued during this report period using a rolling four-ball test machine. Data on several lubricants under the same operating conditions are reported. A summary is presented of the process developed for preparing permanent-contact autoradiograms on metallic surfaces, and the results from autoradiograms obtained on ball sets tested in a Shell sliding four-ball machine are presented. Preliminary results are given of tests performed in a dynamic two-ball tester for the study of film thicknesses and lubrication effects on contact stresses at rolling contacts, using X-ray beam techniques. Recent results from endurance studies intended to determine the effect of lubricant films on endurance in rolling contacts are presented. (Author)

AD-602 662 Div. 26
OTS Prices: HC $2.00/MF $0.50

Institute for Mathematical Studies in the Social Sciences, Stanford Univ., Calif.
AXIOMS AND STRUCTURES OF CONVENTIONAL ACCOUNTING MEASUREMENT.
Technical rept. no. 128,
by Yuji Ijiri. 30 Apr 64, 45p
Contract Nonr225 50, Proj. NR047 004
Unclassified report

Descriptors: (*Management engineering, Linear programming), (*Linear programming, Management engineering), Scheduling, Economics, Set theory, Geometry, Measure theory, Management planning, Operations research.

This paper probes into the foundations of conventional accounting measurements in order to construct a relatively simple axiom system on which a purely mathematical measurement system can be erected and thus provide a consistent basis for examining pertinent aspects of conventional accounting practices. It was shown that if the set of three axioms, axiom of quantities, axiom of ownership, and axiom of exchanges is granted, we can generate, by a set of measurement rules, a uniform measure from a set of physical measures by means of measure imputations through exchanges, in a purely mathematical way without appealing to empirical judgment.

AD-602 663 Div. 26, 17
OTS Prices: HC $2.00/MF $0.50

Aeroprojects, Inc., West Chester, Pa.
DEVELOPMENT OF ULTRASONIC WELDING EQUIPMENT FOR REFRACTORY METALS.
Interim technical progress rept. for Jan-Mar 64,
by Nicholas Maropis. Apr 64, 29p
Contract AF33 600 43026, Proj. 7 888
ASD TR7 888
Unclassified report

Descriptors: (*Welding, Netrasonic radiation), (*Refractory metals, Spot welding), (*Heat-resistant metals and alloys, Welding), Transducers, Power supplies, Ceramic materials.

Design, development, and construction of the 25-kilowatt spot-type welding machine has continued. Experience gained during the evaluation of ceramic transducer assemblies was used to design a 4.2-kilowatt unit. This assembly incorporates all the modifications previously found desirable to improve the electrical characteristics and facilitate heat removal from the ceramic elements. An extensive study of the test model of the overhung-coupler geometry revealed the factors contributing to its unsatisfactory behavior, and necessary modifications are being made. Assembly of the 25-kilowatt power source was completed and acceptance tests were conducted by Aeroprojects personnel. The equipment performance was satisfactory, and the complete assembly was delivered to Aeroprojects. Installation of welder control components on the 25-kilowatt welder frame was completed. (Author)

AD-602 827 Div. 26, 18, 30
OTS Prices: HC $5.00/MF $1.00

David Taylor Model Basin, Washington, D. C.
MODERN MISER, A CRITICAL PATH AND RESOURCE ALLOCATION METHOD FOR THE UNIVAC LARC.
Research and development rept.,
by Abel William Camara and Natalie Tarter Goldberg.
May 64, 192p
Proj. S R003 07 01, Task 10362
DTMB 1796
Unclassified report

Descriptors: (*Naval operations, Operations research), (*Operations research, Naval operations), (*Digital computers, Scheduling), Programming (Computers), Mathematical models, Management planning, Management engineering, Linear programming.

The MODERN MISER System is a planning and scheduling tool developed on the Remington-Rand UNIVAC LARC Computer. It is designed to assist management in comprehending the logical restrictions on a series of activities pertaining to one or many projects. The system includes a basic critical path method, a cost optimization routine, a float allocation procedure, the facility for manpower leveling, and the resource planning and scheduling method. Various algorithms used in the development of the system are discussed. The machine procedure used to adapt these formulas to the LARC are shown. (Author)

AD-602 874 Div. 26, 17, 22
OTS Prices: HC $6.00/MF $1.25

MRD Div., General American Transportation Corp., Niles, Ill.
FEASIBILITY OF WELDING COMBAT VEHICLES BY THE RESISTANCE FLASH WELDING PROCESS.
Final rept.,
by Lee M. Manna and Theodore F. Koch.
1 Jun 64, 248p MR-1199
Contract DA11 022ORD4184
Unclassified report

Descriptors: (*Aluminum alloys, Flash welds), (*Steel, Flash welds), (*Welding, Armored vehicles), (*Armored vehicles, Welding), (*Flash welds, Armored plate), Tanks (Combat vehicles), Optimization, Feasibility studies, Resistance welding, Machines, Power supplies, Arc welding, Manufacturing methods, Costs, Tensile properties, Self-propelled guns, Howitzers, Passenger vehicles, Bibliographies, Industrial equipment, Welding fluxes, Experimental data, Welds.

Conventional and non-conventional methods for accomplishing each step in the flash welding process were reviewed and certain further studies of them were recommended for optimization of the process. Four combat vehicles were redesigned for flash welding and five machines recommended for mass production of them. These

TOWARD THE CALCULATION OF TEMPERATURE STRESS IN COOLED BLADE OF A GAS TURBINE,
by V. I. Rozenblyum. 5 Mar 64, 13p
FTD MT63 212, TT 64 11935

Unclassified report

Edited machine trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) 1961, v. 4, no. 4, p. 32-37.

Descriptors: (*Gas turbine blades, Thermal stresses), (*Thermal stresses, Gas turbine blades), Mathematical analysis, Stresses, Liquid cooled, Elasticity, Boundary layer, USSR.

In the article a formula is derived for calculation of stresses caused by temperature drop through the thickness of the wall of a blade of arbitrary profile with internal cooling. (Author)

AD-602 610 Div. 27, 12, 14
OTS Prices: HC $6.00/MF $1.50

Thiokol Chemical Corp., Brigham City, Utah.
REINFORCED PLASTIC CONSTRUCTION METHODS FOR LARGE ROCKET MOTOR CASE. VOLUME I. PROGRAM SURVEY.
Final technical engineering rept. vol. 1, 5 Mar 61-15 Nov 63,
by W. G. Morse and F. W. Dallon. Dec 63, 272p
Contract AF33 600 42511, Proj. 7 858
RTD TR63 7 858 V1

Unclassified report

Descriptors: (*Rocket cases, Glass textiles), (*Reinforcing materials, Plastics), (*Plastics, Reinforcing materials), Rocket motors, Filament wound construction, Manufacturing methods, Combustion chamber liners, Mandrels, Insulating materials, Test methods, Test equipment, Hydrostatic pressure, Mechanical drawings, Photographs, Performance (Engineering), Analysis, Computers.

The objective of the program was the development of designs, fabrication processes, techniques and equipment for manufacture of fiberglass plastic rocket motor cases. Under Thiokol guidance, case designs and manufacturing methods were established for both monolithic and modular construction of large (44- and 65-in. dia) plastic cases. Design included derivation of dome contours, stress analysis of case assemblies and components, and specification of fiberglass, resin systems, case liners, hardware, and mandrels.

AD-602 611 Div. 27, 12, 14
OTS Prices: HC $7.00/MF $1.50

Thiokol Chemical Corp., Brigham, City, Utah.
REINFORCED PLASTIC CONSTRUCTION METHODS FOR LARGE ROCKET MOTOR CASE. VOLUME II. CASE DESIGN AND FABRICATION.
Final technical engineering rept., vol. 2, 5 Mar 61-15 Nov 63,
by W. G. Morse and F. W. Dallon. Dec 63, 327p
Contract AF33 600 42511, Proj. 7 858
RTD TR63 7 858 V2

Unclassified report

Descriptors: (*Rocket cases, Glass textiles), (*Reinforcing materials, Plastics), (*Plastics, Reinforcing materials), Design, Manufacturing methods, Rocket motors, Filament wound construction, Combustion chamber liners, Mandrels, Materials, Test methods, Stresses, Hydrostatic pressure, Rupture, Performance (Engineering), Photographs, Graphics.

From specifications and drawings, case designs and fabrication processes were established for TU-226A, TU-226B, TU-227A, and TU-227B monolithic fiberglass reinforced plastic cases. These cases were designed and fabricated to develop manufacturing methods for large (65 in. diameter or larger) plastic rocket motor cases. Case design included derivation of dome contours, analysis of dome, case cylinder, and skirt stresses, determination of component weights, and specification of glass filament size, resin system, case liner material, hardware, and case mandrels. Winding patterns and wrapping angles were evaluated by computer program for specific applications. Two cases of each design were fabricated, and at least one case of each design was subjected to hydroburst testing. The TU-226A (Lamtex) case withstood design pressure (1113 psig design; 1164 burst). The TU-227A (Allison) case also withstood design burst pressure (792 psig design; 1185 psig burst). Failures due to causes other than case rupture (forward skirt failure; aft cover plate failure) prevented attainment of case rupture for other cases. (Author)

AD-602 612 Div. 27, 12, 14
OTS Prices: HC $4.00/MF $1.00

Thiokol Chemical Corp., Brigham City, Utah.
REINFORCED PLASTIC CONSTRUCTION METHODS FOR LARGE ROCKET MOTOR CASE. VOLUME III. TU-228 CASE DESIGN AND FABRICATION.
Final technical engineering rept. vol. 3, 5 Mar 61-15 Mar 63,
by W. G. Morse and F. W. Dallon. Dec 63, 129p
Contract AF33 600 42511, Proj. 7 858
RTD TR63 7 858 V3

Unclassified report

Descriptors: (*Rocket cases, Glass textiles), (*Reinforcing materials, Plastics), (*Plastics, Reinforcing materials), Design, Manufacturing methods, Rocket motors, Filament wound construction, Combustion chamber liners, Mandrels, Materials, Test methods, Stresses, Hydrostatic pressure, Rupture, Performance (Engineering), Mechanical drawings, Photographs.

From specifications and drawings, the case design and fabrication processes were established for a modular construction of fiberglass plastic cases. These cases were designed and fabricated to develop manufacturing methods for large (65 in. diameter or larger) plastic rocket motor cases. Cases design included derivation of dome contours; analysis of dome, case cylinder, and skirt stresses; determination of component weights; and specification of glass filament size, resin system, case liner material, hardware, and case mandrels. Winding patterns and wrapping angles were evaluated by computer program for specific applications. Two small cases and one large case were fabricated and subjected to hydroburst testing. The design feasibility and fabrication techniques were successfully proven in subscale tests, in which the cases burst at 143 and 162 percent of the design ultimate pressure. While the larger case burst below design limit (proof) pressure (840 psi burst; 890 psi design), sufficient data, recorded from case behavior under pressure and from analysis of the mode of failure, permitted complete evaluation of the modular design. The stiffness of larger modules introduces deviations which effect case strength and performance under test. (Author)

AD-602 613 Div. 27, 12, 14
OTS Prices: HC $4.00/MF $1.00

Thiokol Chemical Corp., Brigham City, Utah.
REINFORCED PLASTIC CONSTRUCTION METHODS FOR LARGE ROCKET MOTOR CASE. VOLUME IV. TU-290 CASE DESIGN AND FABRICATION.
Final technical engineering rept., vol. 4, 5 Mar 61-15 Nov 63,

27. Propulsion Systems

AD-602 337 Div. 27
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TROLLEYBUS LINE IN SPACE,
by V. Tobolev. 4 Jun 64, 8p
FTD TT64 620; TT 64 11863

Unclassified report

Unedited rough draft trans. of Znanie-Sila (USSR) 1964 [v. 39] no. 2, p. 47-48.

Descriptors: (*Space propulsion, Electric power supplies) (*Ion engines, Electric power supplies), Spacecraft, Cesium, Ionic current, Thrust, Guidance, Electric propulsion, Electric wire, USSR.

A popularized article on electric power supply for ion engines.

AD-602 390 Div. 27, 12
OTS Prices: HC $2.00/MF $0.50

Training Center for Experimental Aerodynamics, Rhode-Saint-Genese (Belgium).
APPROXIMATE ANALYSIS OF OPTIMUM LOW THRUST TRANSFER BETWEEN COPLANAR HYPERBOLIC ORBITS.
Scientific rept. no. 2,
by L. Moulin. May 64, 26p VKI TN15
Grant AF EOAR63 39

Unclassified report

Descriptors: (*Thrust, Numerical analysis), (*Fuel consumption, Optimization), (*Transfer trajectories, Thrust), (*Orbital trajectories, Momentum), Space propulsion, Velocity, Equations; Belgium, Spacecraft.

Optimization of low thrust transfer between coplanar hyperbolic orbits was analyzed on the basis of an approximate analytical solution, in the case of constant thrust set at a constant angle to the velocity vector. The investigation bears upon minimization of fuel consumption and selection of an ideal initial orbit. For given initial and final orbits it is shown that optimum conditions can be obtained with tangential thrust. Further refinement consists of a proper selection of the angular momentum of the initial orbit, so as to either initiate or terminate low thrust propulsion as close as possible to perigee, depending upon the direction of transfer. (Author)

AD-602 429 Div. 27, 9, 12
OTS Prices: HC $5.00/MF $1.00

Sundstrand Aviation-Denver, Denver, Colo.
EFFECT OF REYNOLDS NUMBER ON TURBINE PERFORMANCE AT VARIOUS MACH NUMBERS.
Final rept.,
by Robert G. Adams and James E. Mullaney. 13 Mar 64, 177p CDRD64 7032
Contract NOw61 0605c
AD 433 589

Unclassified report

Descriptors: (*Turbines, Performance (Engineering)), (*Reentry vehicles, Turbines), Reynolds number, Aerodynamic characteristics, Axial flow turbines, Transonic characteristics, Turbine parts, Tests, Nozzles.

An analytical and experimental program was conducted to investigate the inter-relationship of Reynolds Number (Re) and Mach Number (Mn) effect (on the efficiency of axial impulse turbines) in the Re range of from 800 to 10,000 and the Mn range of from 1.15 to 3.0. The optimum pressure split of two-stage re-entry turbines operating in the Re and Mn ranges was determined. The performance potential of two-stage re-entry turbines was formulated. The Re effect on three dimensional flow patterns such as occur in the Silvern tangential flow turbine was investigated. Preliminary trends of Re and Mn inter-relationship inherent in tangential flow turbines were determined.

AD-602 499 Div. 27
OTS Prices: HC $4.00/MF $1.00

Philco Research Labs., Newport Beach, Calif.
AN INVESTIGATION AND DEVELOPMENT OF FILM PROTECTED-CONVECTIVELY COOLED NOZZLES.
Quarterly technical rept. no. 1,
by W. H. Armour, R. L. Mitchell, H. L. Moody, A. M. Saul, and W. L. Smallwood. 22 May 64, 132p U-2621
Contract AF04 611 9705
RPL TDR64 79

Unclassified report

Descriptors: (*Rocket motor nozzles, Design), Protective coverings, Films, Cooling, Heat transfer, Coolants, Methane, Boron compounds, Fluorides, Nitrogen, Turbulent boundary layer, Injection, Thermochemistry, Graphite, Convection, Fluid mechanics, Rocket motors (Solid propellant).

Detail analytical and experimental studies were conducted on internal convection and conduction heat transfer, coolant selection, thermochemistry, and the fluid mechanic aspects of injection through descrete holes in a reacting turbulent boundary layer. Laboratory experiments were conducted to provide insight, data, and direction to the analysis. (Author)

AD-602 534 Div. 27, 1
OTS Prices: HC $2.00/MF $0.50

Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.
SUPERSONIC TRANSPORT PROPULSION SYSTEM CONTINUED RESEARCH AND STUDY OF HIGH TEMPERATURE TURBINE AND EXHAUST NOZZLE NOISE. VOLUME II. EXHAUST NOZZLE NOISE PROGRAM.
Quarterly progress rept. no. 3, 15 Oct 63-15 Jan 64.
15 Feb 64, 33p
Contract AF33 657 9058

Unclassified report

Descriptors: (*Supersonic planes, Jet engine noise), (*Jet engine noise, Inhibition,) (*Turbojet exhaust nozzles, Design), Transport planes, Supersonic nozzles, Model tests, Thrust, Shroud rings, Aerodynamic configurations.

The exhaust nozzle noise research and study program is directed toward the development of an efficient low noise level exhaust system for installation on the propulsion system of the supersonic transport aircraft. The principal accomplishments discussed include: continuation of noise testing, initiation of thrust testing, and reduction and analysis of data from testing conducted on the new concepts for noise suppression in the existing convergent plug-type nozzle model that was investigated previously; and completion of fabrication and a portion of the thrust testing of a new convergent-divergent plug-type model. (Author)

AD-602 567 Div. 27, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

craft engines, Gas turbines), Centrifugal compressors, Design, Gas turbine rotors, Gas turbine nozzles, Engine structures, Cooling, Combustion cambers, Afterburners, Exhaust systems, Transmissions, Bearings, Lubrication, Propeller hubs, Reduction gears, Variable-pitch propellers, Turboprop engines, Fuel systems, Fuel pump, Fuel injectors, Control systems, Speed regulators, Engine starters, Ignition systems.

The book is made up of an introduction and nine parts. The introduction contains a review of the types of aviation engines and the regions of their application, including short expositions of the schematic and design layouts of gas-turbine engines; certain fundamental concepts and definitions necessary for subsequent study of the design of the engines are given; values of the fundamental parameters of the gas-turbine engines are presented, as is a basic review of their design and development. The first, second, and third parts describe in succession the construction of the air-flow parts of the engines. Parts four and five consider the power systems of gas-turbine engines, the transmission elements, bearings, and lubrication systems; basic data on the critical speeds of rotation of rotors are also presented. The sixth part is devoted to specific units of the turboprop engine-the hub of the propeller and the reduction gear. The seventh part contains material on the construction of fuel pumps and atomizers, and their operation. Basic data on systems for automatic control of gas-turbine engines is presented in the eighth part. Finally, the ninth part is devoted to starting systems for gas-turbine engines.

AD-602 680 Div. 27
OTS Prices: HC $3.00/MF $0.75

Naval Boiler and Turbine Lab., Philadelphia, Pa.
STEAM DRUM INTERNALS EVALUATION FOR LPH-2 BOILER IN DD-596 BOILER.
Final evaluation test rept.,
by E. T. Mitnaul and D. G. Hansen. 24 Jun 64, 72p
Proj. B423
NBTL B423

Unclassified report

Descriptors: (*Steam power plants, Design), (*Boilers, Steam power plants), Centrifuge separation, Metal plates, Installation, Performance (Engineering), Feed water, Marine engines, Steam pipes, Boiler tubes, Test methods.

Ten internal steam drum moisture separating baffle arrangements were evaluated for possible use in LPH-2 main boilers. The plate type baffle arrangements were of designs which were simpler to manufacture and install in steam drums. An arrangement was found that satisfied the requirements of the applicable specification. Later use of the arrangement on LPH-2 test boiler indicated that the arrangement was unsatisfactory for that installation. In the interest of meeting schedules, it was decided to discontinue development of plate type baffles for LPH-2 and install centrifugal type separators. (Author)

AD-602 731 Div. 27, 25
OTS Prices: HC $4.00/MF $0.75

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
RECENT EXPERIMENTAL STUDIES OF MECHANICAL NOISE IN DIESEL ENGINES.
Phase 2,
by Donald Ross and E. E. Ungar. 10 Jul 64, 108p
BBN 1139
Contract NObs88480, Proj. SF013 11 01, Task 1355

Unclassified report

Descriptors: (*Internal combustion engine noise, Diesel engines), (*Diesel engines, Engine noise), Noise, Compressor noise, Vibration, Pistons, Engine cylinders, Pressure, Tests, Acoustics, Data, Graphics, Great Britain, USSR.

The results of some recent British and Russian studies are found to indicate that rate of pressure rise, as well as piston-cylinder clearance and piston geometry, are of importance in relation to the mechanical noise and vibration of single-cylinder diesel engines. A dependence of noise on piston clearance and on offset of the piston pin is observed even in engines in which combustion noise appears to be dominant. Also, the porting of oil through the piston wall is found to cause significant reductions in some parts of the noise spectrum.

AD-602 770 Div. 27, 9
OTS Prices: HC $3.00/MF $0.75

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
INFLUENCE OF PERTINENT PARAMETERS ON EJECTOR-DIFFUSER PERFORMANCE WITH AND WITHOUT EJECTED MASS,
by James W. Hale. Jul 64, 77p
Contract AF40 600 1000
AEDC TDR64 134

Unclassified report

Descriptors: (*Rocket motors, Test facilities), (*Jet pumps, Performance (Engineering)), (*Diffusers, Performance (Engineering)), Rocket motor nozzles, Conical nozzles, Nozzle clusters, Pressure, High altitude, Simulation.

Data from various diffuser model studies were analyzed to determine the influence of pertinent parameters on ejector-diffuser performance with and without ejected mass from the test cell. The parameters varied were conical nozzle area ratio (3.15 to 18.00), diffuser shape (straight or with various types of bends), mass ejected from the test cell (from 0.11 to 1.31 percent of rocket flow) for different nozzle configurations (single-, two-, and four-nozzle cluster) and diffuser sizes (4.026- to 10.02-in. diam), and ratio of diffuser-to-nozzle exit area on start and breakdown diffuser pressure ratio with respect to second-throat contraction ratio. (Author)

AD-602 774 Div. 27, 12, 26
OTS Prices: HC $2.00/MF $0.50

ARDE-Portland Inc., Paramus, N. J.
CRYOGENIC STRETCH-FORMING OF SOLID PROPELLANT ROCKET CASES.
Quarterly rept. 8 for 1 Mar 63-31 May 64,
by R. H. Alper. 31 May 64, 26p
Contract DA30 069ORD3501

Unclassified report

Descriptors: (*Rocket cases, Stretch forming), Rocket components, Models (Simulations), Manufacturing methods, Dies, Tolerances (Mechanics), Machining, Welds, Stresses, Tensile properties, Metal spinning, Rocket motor nozzles, Attachment, Rocket motors (Solid propellant), Guided missiles (Surface-to-surface).

The effect of closer die tolerances and additional overpressure on the out-of-roundness of the Pershing subscale cases was examined and determined to significantly reduce the tolerances on the vessel. The effect of the addition of skirts and end rings to stretched Pershing subscale vessels on the room temperature strength level was determined. No significant decrease in yield strength of the vessel was noted. Some problems in the spinning of the components for

by W. G. Morse and F. W. Dallon. Dec 63, 134p
Contract AF33 600 42511, Proj. 7. 858
RTD TR63 7 858 V4

Unclassified report

Descriptors: (*Rocket cases, Glass textiles), (*Reinforcing materials, Plastics), (*Plastics, Reinforcing materials), Filament wound construction, Design, Manufacturing methods, Rocket motors, Rocket motor nozzles, Test methods, Stresses, Hydrostatic pressure, Rupture, Materials, Performance (Engineering), Mechanical drawings, Photographs, Graphics.

From specifications and drawings, case designs and fabrication processes were established for the TU-290 monolithic fiberglass case. Phase III program requirements specified development, by progressive improvement of case design following fabrication, hydroburst, and evaluation, of a single nozzle case; a case to have a motor mass fraction (excluding igniter) of 0.965, and which could withstand 400,000 psi hoop stress at a burst pressure of 792 psig. The first three (of five) cases were hydroburst to evaluate designs, materials, winding equipment, and fabrication techniques. These cases withstood 575,660, and 750 psig, respectively. The results for case No. 3(379,000 psi hoop stress at 750 psig) were considered to satisfy design aims and objectives (Supplemental Agreement No. 5, dated 6 June 1963). The remaining two cases, fabricated with insulation, successfully withstood hydroproof testing at 550 psig. For subsequent tests on these cases, motor and nozzle designs were prepared. A single, recessed, fixed, conical nozzle was fabricated and delivered to the Air Force for each of the two cases. (Author)

AD-602 614 Div. 27, 12, 14
OTS Prices: HC $4.00/MF $0.75

Thiokol Chemical Corp., Brigham City, Utah.
REINFORCED PLASTIC CONSTRUCTION METHODS FOR LARGE ROCKET MOTOR CASE. VOLUME V. MANDRELS.
Final technical engineering rept., vol. 5, 5 Mar 61-5 Mar 63,
by W. G. Morse and F. W. Dallon. Dec 63, 101p
Contract AF33 600 42511, Proj. 7 858
RTD TDR63 7 858 V5

Unclassified report

Descriptors: (*Rocket cases, Glass textiles), (*Mandrels, Design), (*Plastics, Reinforcing materials), Industrial equipment, Material forming, Manufacturing methods, Glass textiles, Cost, Reliability, Performance (Engineering), Mechanical drawings, Photographs.

Mandrels have been developed during this program for rocket motor use in R and D or in production programs. The mandrel design must be selected to accent flexibility of tooling for changes in case design, or to accent durability in repeated use, for economy in case production. Mandrel cost, weight, performance, and reliability must also be considered. A plaster or a plaster-shell-over-plywood construction readily permits changes in dome contours or case wall diameters. A cast mandrel of sand and resin, or a mandrel having extruded aluminum segments, required a low capital outlay and permits high case production rates if the case configuration is fixed. The sand-resin mandrel is relatively heavy among the five designs used. The dimensional stability and the light weight of the extruded mandrel are positive assets for fabrication of fiberglass cases larger than 60 in. dia but certain factors are not clearly defined (the reliability of its unique pressurization system and the potentially variable tension on glass fibers wound over aluminum). (Author)

AD-602 615 Div. 27, 12, 14
OTS Prices: HC $6.00/MF $1.50

Thiokol Chemical Corp., Brigham City, Utah.
REINFORCED PLASTIC CONSTRUCTION METHODS FOR LARGE ROCKET MOTOR CASE. VOLUME VI. STRESS ANALYSIS,
Final technical engineering rept. vol. 6, 5 Mar 61-15 Nov 63,
by W. G. Morse and F. W. Dallon. Dec 63, 295p
Contract AF33 600 42511, Proj. 7 858
RTD TR63 7 858 V6

Unclassified report

Descriptors: (*Rocket cases, Glass textiles), (*Reinforcing materials, Plastics), (*Plastics, Reinforcing materials), Filament wound construction, Design, Stability, Stresses, Loading (Mechanics), Equations, Mathematical analysis.

To complete contractual requirements, a detailed stress analysis was completed for each case design developed in the program. Empirical equations for basic cylinder, dome, skirt, blast tube reinforcement, and metal parts design were derived, together with general equations for stability (buckling under load) and discontinuity analysis. Specific evaluation of each case design for these considerations was completed, together with an analysis of design deviation from general conditions, or analysis of redesigned portions, where appropriate. Following analysis, each case design was established as capable of withstanding all stresses imposed under normal flight sequence. (Author)

AD-602 632 Div. 27
OTS Prices: HC $4.00/MF $1.00

Goodyear Aerospace Corp., Akron, Ohio.
STUDY OF THE EFFECTS OF MECHANICAL DAMAGE ON THE PERFORMANCE OF FILAMENT-WOUND MOTOR CASES.
Final rept. for 1 Apr 63-1 May 64,
by R. A. Burkley, T. J. Boller, and L. R. Butcher.
20 Jun 64, 130p GER11623
Contract NOw63 0449c

Unclassified report

Descriptors: (*Rocket cases, Filament wound construction), (*Filament wound construction, Rocket cases), Damage, Glass textiles, Steel, Failure (Mechanics), Stresses, Tests, Plastics, Design, Processing, Pressure vessels, Adhesives, High pressure research, Guided missiles (Underwater-to-surface).

The objectives of the study program were to study the effects of surface flaws on the performance of Polaris filament-wound motor cases, to compare the effect of winding sequence on the ability to resist failure from surface flaws, and to determine the feasibility of various repair techniques. These objectives were accomplished through the fabrication, machine flawing, and hydrotesting of 6- and 18-inch diameter filament-wound bottles. The bottles were fabricated with WS-1028A preimpregnated glass roving, and the wall thicknesses wre similar to the full-scale Polaris A-3 first- and second-stage motor cases. (Author)

AD-602 634 Div. 27, 1
OTS Prices: HC $9.25/MF $2.75

Foreign Tech. Div,, Air Force Systems Command, Wright-Patterson AFB, Ohio.
DESIGN OF AIRCRAFT GAS TURBINE ENGINES,
by A. V. Shtoda, S. P. Aleshchenko, A. Ya. Ivanov, V. S. Krasavtsev, and F. N. Morozov. 4 Jun 64, 625p
FTD TT63 405, TT 64 11980

Unclassified report

Unedited rough draft trans. of mono. Konstruktsiya Aviatsionnykh Gazoturbinnykh Dvigatelei, Moscow, 1961, 411p.

Descriptors: (*Gas turbines, Aircraft engines), (*Air-

28. Psychology and Human Engineering

AD-602 354 Div. 28
OTS Prices: HC $3.00/MF $0.75

Educational Testing Service, Princeton, N. J.
INTELLIGENCE AND THE ABILITY TO LEARN.
Doctoral thesis,
by James P. Duncanson. Jun 64, 60p RB 64 29
Contracts Nonr1858 15, Nonr2214 00; Grant NSF G22889,
Projs. NR150 088, NR151 174

Unclassified report

Descriptors: (*Learning, Intelligence tests) (*Intelligence tests, Learning), Psychomotor tests, Reasoning, Memory, Perception, Vocabulary, Verbal behavior, Job analysis, Psychometrics, Factor analysis.

A methodological advance was made in the early 1950's in the area of motor learning. A number of ability tests were factor analyzed in a battery which included scores made at various stages of practice on a complex pschomotor task. Inspection of the loadings indicated that abilities did contribute to the learning performance, thus establishing a relationship between abilities and learning. The same approach has since been applied to cognitive tasks with the finding that learning and abilities are related, but that there are also learning factors which are independent of the measured abilities. This study is an attempt to clarify these learning factors. It was concluded that (a) measured abilities are related to measured learning performance, (b) learning performance depends upon factors which are independent of ability measures, (c) learning in one task is related to learning in others, and (d) performance in concept-formation tasks is not related to the ability measures used or to performance in rote-memory tasks. (Author)

AD-602 369 Div. 28
OTS Prices: HC $1.00/MF $0.50

Institute of Behavioral Research, Texas Christian Univ., Fort Worth.
DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
Quarterly status rept.,
by S. B. Sells. 1 Jul 64, 4p
Contract Nonr3436 00

Unclassified report

Descriptors: (*Behavior, Psychophysiology), (*Psychophysiology, Behavior), Psychometrics, Group dynamics, Students, Ecology, Meteorological parameters, Stimulation, Measurement, Factor analysis.

Briefly, the aim of the present project is the quantitative measurement, dimensional description, and eventual taxonomic analysis of the physical and social environmental variables that are antecedents and concomitants of human behavior. It is believed that progress toward these objectives will increase the understanding of individual behavior (account for greater proportion of variance), and will enhance the prediction of individual behavior on various criteria.

AD-602 386 Div. 28, 32
OTS Prices: HC $5.00/MF $1.50

Institute for Psychological Research, Tufts Univ., Medford, Mass.
HUMAN ENGINEERING BIBLIOGRAPHY, 1961-1962,
by Paul G. Ronco. Oct 63, 317p
Contract Nonr494 13
ONR acr86

Unclassified report

Jointly sponsored by Engineering Psychology Branch, Psychological Sciences Div., ONR, Behavioral Sciences Lab., Wright Air Development Center, USAF, and Office, Chief of Research and Development, Dept. of the Army.

Descriptors: (*Human engineering, Bibliographies), (*Bibliographies, Human engineering), Abstracts, Psychology, Behavior, Test methods, Statistical tests, Personnel, Job analysis, Psychophysiology, Sensory perception, Electronic equipment, Anthropometry, Clothing, Environment, Machines, Cybernetics, Transportation, Space flight, Motion, Drugs, Nutrition, Training devices, Aging (Physiology), Radiation effects, Reaction (Psychology), Group dynamics, Communication theory, Linear programming, Performance (Human).

The bibliography lists approximately 3,600 titles and abstracts in the field of human engineering.

AD-602 392 Div. 28, 23
OTS Prices: HC $3.00/MF $0.75

Applied Psychological Services, Wayne, Pa.
THE DEVELOPMENT AND APPLICATION OF ABSOLUTE SCALES OF ELECTRONIC JOB PERFORMANCE.
by Arthur I. Siegel, Douglas G. Schultz, and Richard S. Lanterman. Jun 64, 95p
Contract Nonr4153 00

Unclassified report

Descriptors: (*Performance tests, Electronic technicians), (*Job analysis, Psychometrics), (*Psychometrics, Military requirements), Applied psychology, Scale, Aviation personnel, Naval personnel, Performance (Human).

The development and logic of a technique for evaluating the performance level of naval avionics technicians without reference to normative materials is described. The technique, which relates the performance level of the technician, as derived from a Guttman scale, to a series of fleet objectives, was found to be reliable and usable. The results of its application to a sample of naval avionics technicians are described. (Author)

AD-602 516 Div. 28
OTS Prices: HC $1.00/MF $0.50

Naval Training Device Center, Port Washington, N. Y.
ONE-TRIAL LEARNING AND QUANTUM PSYCHOPHYSICS: A SYNTHESIS.
Technical rept.
by Richard J. Anderson. Jun 64, 11p
NAVTRADEVCEN IH7

Unclassified report

Descriptors: (*Learning, Psychophysiology), (*Psychophysiology, Mathematical models), (*Psychometrics, Psychophysiology), Thresholds (Physiology), Measurement, Sensory perception, Stimulation, Word association, Reaction (Psychology), Auditory perception, Training, Reflexes.

A brief overview of the concepts of quantum psychophysics and of one-trial learning and their inconsistencies is noted. The two general concepts must be synthesized through a new quantum psychophysical model in order to produce a clearer understanding of the processes involved. Benefits in training and/or instructional programs will accrue from such a synthesis. (Author)

AD-602 661 Div. 28, 16
OTS Prices: HC $3.00/MF $0.50

Human Engineering Lab., Aberdeen Proving Ground, Md.

the full scale preform were encountered and overcome. Design analysis of the stresses encountered during the stretching of both the subscale and projected full scale cases indicated marginal stresses in the vicinity of the juncture of the aft cone and the aft cylinder of the preform. Design of a preform for a very high strength subscale case was started. (Author)

AD-602 805 Div. 27, 12
OTS Prices: HC $4.00/MF $0.75

Arde-Portland, Inc., Paramus, N. J.
COOLED SOLID PROPELLANT ROCKET NOZZLES, Final rept., vol. 1,
by Sidney Elkind. 15 Jun 64, 106p A-P FR-5601 V1
Contract DA30 069ORD3099, Task B
Unclassified report

A port.on of this document is illegible or non-reproducible.

Descriptors: (*Rocket motor nozzles, Liquid cooled), (*Liquid metal coolants, Lithium), (*Lithium, Coolants), Solid rocket propellants, Rocket motors, Cooling, convection, Sprays, Film cooling, Test equipment, Design, Mechanical drawings, Tests, Reviews.

A study was made to evaluate the potential of the liquid metal lithium as a coolant for solid propellant rocket nozzles. The program plan included the analysis, design, and testing of two cooling systems: Convection; and Spray film. A literature survey was made to review the state-of-the-art of rocket nozzle cooling. (Author)

AD-602 806 Div. 27,12
OTS Prices: HC $5.00/MF $1.00

Arde-Portland, Inc., Paramus, N. J.
COOLED SOLID PROPELLANT ROCKET NOZZLES, Final rept., vol. 2,
by Sidney Elkind. 15 Jun 64, 195p A-P FR-5601 V2
Contract DA30 069ORD3099, Task B
Unclassified report

A portion of this document is illegible or non-reproducible.

Descriptors: (*Rocket motor nozzles, Liquid cooled), (*Liquid metal coolants, Lithium), (*Lithium, Coolants), Rocket motors (Solid propellant), Cooling, Convection, Sprays, Film cooling, Test methods, Tests, Instrumentation, Experimental data, Reviews.

A study was made to evaluate the potential of the liquid metal lithium as a coolant for solid propellant rocket nozzles. The program plan included the analysis, design, and testing of two cooling systems: Convection; and Spray film. A literature survey was made to review the state-of-the-art of rocket nozzle cooling (Author)

AD-602 869 Div. 27, 12
OTS Prices: HC $7.00/MF $1.50

RCA Defense Electronic Products, Burlington, Mass.
GIMBALLED VS FIXED ENGINE INVESTIGATION.
Interim technical rept.
2 Aug 63, 303p CR29
Contract AF04 695 273, Task 5 1 2 5 Unclassified report

A portion of this document is illegible or non-reproducible.

Descriptors: (*Thrust vector control systems, Spacecraft), (*Rocket motors, Configuration), Rocket propellants, Sloshing, Feedback, Engines and motors, Gimbals, Center of gravity, Velocity, Moments, Weight, Acceleration, Performance (Engineering), Mathematical analysis, Rocket motor noise.

The report contains the results of a study of 8 different types of thrust vector altitude control systems for space vehicle applications. Expected constant and sinusoidal disturbance moments are derived. The linear disturbance feedback from propellant sloshing is derived. The methods of determining disturbance inputs from structural vibration and system noise are outlined. The dynamic effects of the linear disturbance feedback from propellant sloshing are analyzed and modifications to the control system designs are made when necessary to insure system stability. The transient responses of the linear systems to a step disturbance moment are calculated. The relative efficiency, weight, and complexity of fixed versus gimballed systems are analyzed for two arbitrarily selected thrust levels. The effects of gimbal angle limitations on the performance of the control system used for the gimballed engine with hinge line ahead of the vehicle cg are examined. (Author)

AD-602 877 Div. 27, 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CONFERENCE ON ROTOR VIBRATIONS CAUSED BY THE LUBRICATING LAYER OF PLAIN BEARINGS,
by V. O. Olimpiev. 14 Jul 64, 5p
FTD TT64 508, TT 64 71131
Unclassified report

Unedited rough draft trans. of Energomasninostroenie (USSR) 1963 v. 9 no. 7, p. 21.

Descriptors: (*Rotor blades (Turbomachinery), Vibration), (*Bearings, Lubrication), Turbines, Generators, Scientific research, USSR, Symposia.

AD-602 882 Div. 27, 12
OTS Prices: HC $1.00/MF $0.50

Chemical Propulsion Information Agency, Applied Physics Lab., JHU, Silver Spring, Md.
PROCEEDINGS OF THE MEETING OF THE ICRPG WORKING GROUP ON DESIGN AUTOMATION (6TH).
7 Nov 63, 16p CPIA Pub-35
Contract NOw62 0604c
Unclassified report

Descriptors: (*Symposia, Automation), (*Automation, Symposia), (*Rocket motors (Solid propellant), Optimization), (*Rocket motors, Propellant grains), Design, Interior ballistics, Programming (Computers), Rocket propulsion, Aerodynamic characteristics.

Contents:
Solid Rocket Propulsion System Optimization Study,
Generalized Three-Dimensional Grain Design Program,
Program Integration Committee Report,
Performance Subcommittee Report,
Design Subcommittee Report,
Evaluation Subcommittee Report,
Program Inventory Committee Report.

The Enlistment Screening Test (EST), used by recruiters to determine whether male applicants for enlistment should be sent on for further testing with the Armed Forces Qualification Test, is a 48-item test. Recent developments in psychological testing point to the use of much shorter tests for such limited objectives as estimating the likelihood that an individual will be able to qualify for military service on the AFQT. Forty 8-item tests were assembled from AFQT 7 and 8 on the basis of item data available from the standardization study. Two methods of selecting items and two methods of establishing cutting scores were applied experimentally. The 8-item tests were highly comparable to the 48-item EST in the percentages of examinees classified the same as they were classified by AFQT. The simpler methods of selecting items and setting cutting scores proved as effective as the more elaborate and time-consuming methods. (Author)

PHYSIOLOGICAL RESPONSES OF MEN TO WET TROPICAL ENVIRONMENTAL CONDITIONS (OPERATION SWAMP FOX II),
by Arthur A. Woodward, Jr. Jan 64, 52p
HEL TM2 64

Unclassified report

Descriptors: (*Army personnel, Tropical tests), (*Heat tolerance, Army personnel), Armored vehicles, Acclimatization, Adaptation (Physiology), Environmental tests, Body temperature, Pulse rate, Perspiration, Stress (Physiology), Humidity, Psychomotor tests, Human engineering, Panama.

Army personnel under heat stress were observed while walking up and down a 12.5 degree slope and while confined (as a squad) for up to six hours in an armored personnel carrier at an unforested tropical site. Measurements of bodily temperatures, pulse rates, and sweat production were used as indices of heat strain in the men. Subjects walking in the sun, unloaded, did not suffer excessive heat strain under midday tropical conditions. About two-thirds of the sweat produced was evaporated for body cooling. Data on confined men showed there was little risk they would become heat casualties when exposed to effective temperatures up to 33.3C. (92.0F.) for as long as four hours. The men showed physiological adjustments to changes in environmental stress in less than 10 minutes. (Author)

AD-602 861 Div. 28
OTS Prices: HC $3.00/MF $0.75

Matrix Corp., Arlington, Va.
USE OF AN ENGINEERING ANOLOGY IN THE DEVELOPMENT OF TESTS TO PREDICT TRACKING PERFORMANCE,
by James F. Parker, Jr. Feb 64, 63p
Contract Nonr3065 00

Unclassified report

Descriptors: (*Tracking, Performance tests), (*Job analysis, Test construction (Psychology)), Psychomotor tests, Motor reactions, Performance (Human), Operators (Personnel), Perception (Psychology), Display systems, Control systems, Simulation, Correlation techniques, Errors.

The study attempted to describe performance in a complex perceptual-motor task in terms of a limited number of basic abilities. The criterion tracking task was considered complex since it involved a dual display, second order control system characteristics, and a requirement for dual error-nulling. A total of eight hours of practice, distributed over six weeks, was required for mastery of this task. An engineering analogy of the criterion task was developed. This analogy, based on servo-mechanics theory, was used to specify the basic activities involved. These activities in turn were used in hypothesizing a set of abilities believed to underlie task proficiency. To the extent possible, for each hypothesized ability three tests were constructed. It was hoped that these tests would serve as predictors of performance in the tracking task. These tests were classified as paper-and-pencil, electronic, and mechanical. (Author)

AD-602 964 Div. 28, 16
OTS Prices: HC $1.00/MF $0.50

Laboratory of Psychophysics, Harvard Univ., Cambridge, Mass.
PROGRESS REPORT NO. 42 [SUMMARIES OF RESEARCH COMPLETED AND IN PROGRESS ON PSYCHOPHYSICS].
Rept. for 1 Jan-30 Jun 64,
30 Jun 64, 18p PPM 106
Grants NSF G10716, NIH B2974 Unclassified report

Work also supported by American Otological Society.

Descriptors: (*Sensory perception, Abstracts), (*Perception (Psychology), Abstracts), (*Bibliographies, Psychophysiology), Taste, Stimulation, Psychoacoustics, Thresholds (Physiology), Color vision, Brightness, Pitch discrimination, Adaptation (Physiology), Reports.

Summaries of completed research and research in progress in the field of psychophysics are presented. Subjects include the various sensory perceptions and physiological thresholds, and their applicability to psychology.

AD-602 978 Div. 28
OTS Prices: HC $1.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
PRELIMINARY EVALUATION OF SIMULATED BRANCHING TESTS,
by Carrie Jean Waters. Jun 64, 25p
Proj. 2J024701A722
APRO TRN140

Unclassified report

Rept. on a portion of subtask g, 'Feasibility of programmed machine testing techniques.'

Descriptors: (*Psychometrics, Army personnel), (*Test construction (Psychology), Automation), (*Army personnel, Psychometrics), Feasibility studies, Aptitude tests, Model theory, Reaction (Psychology), Performance (Human), Distribution, Correlation techniques, Simulation, Personnel management.

As a basis for proceeding with the exploration of automated techniques in the psychological testing of potential input, a study was undertaken to compare conventional and branching type tests with respect to correlation between test score and ability. Using a theoretical model, five hypothetical tests were evaluated: four 5-item conventional tests in which all examinees took the same items in a fixed order of item presentation, and a branching test. The branching test contained 15 items, but each hypothetical examinee responded only to the five to which he was routed by his success or failure on the initial and successive items. Two scoring methods were tried out for the branching test: number of correct responses and integer values assigned on the basis of the difficulty level of the final item attempted and examinee's performance on that item. With either scoring method, the branching test yielded higher test-ability coefficients than did any of the conventional tests. (Author)

AD-602 979 Div. 28
OTS Prices: HC $2.00/MF $0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
FEASIBILITY OF ABBREVIATED FORMS FOR THE ENLISTMENT SCREENING TEST,
by Carrie Jean Waters and Emil F. Heermann.
May 64, 44p
Proj. 2J024701A722
APRO TRN144

Unclassified report

Rept. on a portion of Subtask c, 'Methods for improving testing'.

Descriptors: (*Aptitude tests, Army personnel), (*Test construction (Psychology), Aptitude tests), Army training, Statistical analysis, Feasibility studies.

30. Research and Research Equipment

AD-602 318 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE QUESTION OF SELF-TEACHING IN THE PERCEPTION, by V. M. Glushkov. 25 May 64. 20p
FTD TT64 299, TT 64 11853

Unclassified report

Unedited rough draft trans. of Zhurnal Vychislitel'noi Matematiki i Matematicheskoi Fiziki (USSR) 1962, v. 2, no. 6, p. 1102-1110.

Descriptors: (*Pattern recognition, Machines), Bionics, Artificial intelligence, Input-output devices, USSR, Feedback, Mathematical analysis, Probability, Circuits.

The article deals with certain problems associated with the behavior of discrete alpha-perceptrons in the self-teaching regime. In this case the teacher is absent and the processes of self-organization which lead to an alteration in image classification carried out by the perceptron are determined by the introduction of positive feed-back in the perceptron circuit. (Author)

AD-602 362 Div. 30, 8, 25
OTS Prices: HC $3.00/MF $0.75

Sperry Gyroscope Co., Great Neck, N. Y.
DESIGN CRITERIA STUDY FOR HIGH POWER HIGH VOLTAGE RESEARCH FACILITY.
Quarterly rept. no. 3, 1 Jan-31 Mar 64.
Apr 64, 88p EB-5296 0359 3
Contract DA36 039AMC03199E, Proj. 1G6 22001A055 04

Unclassified report

Descriptors: (*Plasma physics, Test facilities), (*Microwave equipment, Test facilities), (*Laboratories, Design), Physics laboratories, Power supplies, Power equipment, Electron tubes, Modulators, Electromagnetic pulses, L band, X band, Resonators, Waveguides, Buildings.

A survey was made of the various uses of the facility in the investigation of plasma physics and the effects of the plasma phenomena. The high voltage power supply, resonant rings, drivers and modulators to be used in the facility were delineated. Three modulators, three resonant rings, and two drivers will be included in the initial facility configuration. The modulators will be hard tube, soft tube, and floating deck types and the drivers will be L-band pulsed and X-band c-w types. The resonant rings will be oversized waveguide at L-band and X-band frequencies and circular waveguide at X-band. The initial building design was completed and a layout is included. The initial facility configuration comprises five major areas: administration, auxiliary equipment and shops, test bay, transformer vault, and capacitor vault. (Author)

AD-602 411 Div. 30, 8, 14
OTS Prices: HC $3.00/MF $0.75

Hughes Aircraft Co., Culver City, Calif.
ELECTRICAL AND ELECTRONIC PROPERTIES OF MATERIALS: INFORMATION RETRIEVAL PROGRAM.
Rept. for 22 Jan 63-31 Jan 64,
by H. Thayne Johnson and Dana H. Johnson. Apr 64, 89p P-64 10
Contract AF33 616 8438, Proj. 7381, Task 738103
ASD TDR62 539 P3

Unclassified report

Descriptors: (*Information retrieval, Electronics), Bibliographies, Abstracting, Indexes, Computers, Abstracting, Periodicals, Reports, Materials, Electrical properties.

The use of the Electronic Properties Information Center's collection, a modified pre-coordinated index, indexed for storage and retrieval either manually or through a 1401 Computer, is treated briefly and note is made of changes. The nine categories of materials searched, indexed and documented are semiconductors, insulators, ferrites, ferroelectrics, ferromagnetics, electroluminescents, thermionic emitters, metals and superconductors. The overlapping and interdependence of materials in these categories is discussed. Approximately 11,500 articles had been collected and indexed and 1200 pages of data sheets published as this report was completed. (Author)

AD-602 506 Div. 30
OTS Prices: HC $4.00/MF $0.75

Westinghouse Defense and Space Center, Baltimore, Md.
STUDY AND INVESTIGATION TO DEVELOP COMPILER TECHNIQUES REQUIRED FOR PROGRAMMING THE PARALLEL NETWORK COMPUTER.
Final rept.
Jun 64, 108p
Contract AF30 602 3146, Proj. 5581, Task 558109
RADC TDR64 175

Unclassified report

Descriptors: (*Programming (Computers), Compilers), (*Compilers, Programming (Computers)), Control sequences, Computer logic, Input-output devices, Instruction manuals.

This report describes the work completed on the first phase of a planned program to develop techniques for a compiler to assist in the programming of parallel network computers (SOLOMON computer in particular). The one-year development contract was terminated by directive of DOD, DDRandE after four months of progress; therefore, only the specification of an assembly language for the parallel network computer was completed. (Author)

AD-602 515 Div. 30, 28
OTS Prices: HC $1.00/MF $0.50

Creedmoor Inst. for Psychobiologic Studies, Queens Village, N. Y.
A FORCE-TRANSDUCING MANIPULANDUM FOR USE WITH DOGS.
Technical rept. no. 4,
by Michael Kaplan and Richard V. P. Loesch. 1964, 6p
Contract Nonr2850 00

Unclassified report

Descriptors: (*Laboratory equipment, Psychology), (*Psychology, Laboratory equipment), Laboratory animals, Dogs, Voltage, Transducers, Recording systems, Preamplifiers, Reaction (Psychology), Design, Psychophysiology, Test equipment.

A pedal-pressing manipulandum for use with dogs is described. The device transduces forces from zero to 10,000 grams, and voltage output is linear over the entire range. (Author)

AD-602 528 Div. 30, 13, 15
OTS Prices: HC $2.00/MF $0.50

Institute for the Study of Fatigue and Reliability,

29. Quartermaster Equipment and Supplies

AD-602 732 Div. 29, 30
OTS Prices: HC $1.00/MF $0.50

Army Natick Labs., Mass.
PALLETIZED UNIT LOAD SPRAY FACILITY, DESIGN AND TEST.
Interim rept.,
by Joseph P. Akrep. Mar 64, 11p
Proj. 1K6 43324 0587
ANL TR245

Unclassified report

Descriptors: (*Containers, Environmental tests), (*Test facilities, Sprays), Design, Spray nozzles, Pressure gages, Flowmeters, Wind, Rainfall, Simulation, Water, Surfaces, Pallets.

A palletized unit load spray facility was designed to provide approximately the equivalent exposure as prescribed for small boxes by ASTM D-951-51, except that clear area dimensions were expanded to accommodate specimens up to and including pallet size unit loads. Various sizes and types of nozzles were investigated to establish optimum spray pattern coverage and flow characteristics. Final design gave a clear space of approximately 10ft. x 9ft. 4in. x 8ft. high with sufficient maneuver room to bring in specimens up to and including full palletized unit loads and CONEX inserts. The completed unit was calibrated for flow versus pressure using a variable built-in line pressure regulator and flow meter to approximate the ASTM requirement for 2 to 2-1/2 gallons/hour/square foot, which is approximately 4-1/3 inches per hour or a steady tropical rain, with the added provision for horizontal spray to simulate wind-blown rain. In view of the spray strike pattern and surface wetting characteristics obtained, the design is considered a successful compromise of all the factors and limitations involved for the purpose intended. (Author)

AD-602 772 Div. 29
OTS Prices: HC $3.00/MF $0.75

Army General Equipment Test Activity, Fort Lee, Va.
ABSTRACT BIBLIOGRAPHY TECHNICAL REPORTS PUBLISHED FISCAL YEAR 1964.
July 64, 81p

Unclassified report

Descriptors: (*Bibliographies, Abstracting), (*Army equipment, Tests), (*Food, Tests), Clothing, Logistics, Radiation effects, Reports, Containers.

Abstracts are given on engineering tests of equipment in general use throughout the Army.

AD-602 810 Div. 29
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Baltimore, Md.
WATER INTAKE AND RESUSCITATION EQUIPMENT FOR PROTECTIVE MASKS.
Quarterly progress rept. no. 1, 1 Apr-30 Jun 64,
by E. D. Legg. 15 Jul 64, 14p
Contract DA18 035AMC123A

Unclassified report

Descriptors: (*Protective mask facepieces, Water), (*Artificial respiration, Protective mask facepieces), Army personnel, Casualties, Air pollution, Human engineering, Thirst, Safety devices, Storage, Design.

The development of low cost highly reliable equipment to be used in service protective masks which will allow the soldier in the field to drink water and to resuscitate battle field casualties while masked in a CB contaminated atmosphere is discussed. There is no such equipment in use at the present time, so that the specific design of the equipment will depend upon laboratory and field testing data obtained during the course of the program. The program is divided into three phases:
(1) Development - up to 3 models of three units each.
(2) Prototype - 6 units of best development model.
(3) Pre-production - 36 units of improved prototype.
This report covers a portion of the first phase.
(Author)

AD-602 815 Div. 29
OTS Prices: HC $1.00/MF $0.50

Hexcel Products, Inc., Berkeley, Calif.
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
Monthly progress rept. no. 5 for May 64,
by E. C. Vicars. 16 Jun 64, 18p
Contract DA04 200AMC477A

Unclassified report

Descriptors: (*Honeycomb cores, Tests), (*Aluminum, Honeycomb cores), Drop testing, Energy, Absorption, Vibration, Experimental data, Containers.

Descriptors: (*Shelters, Portable), (*Maintenance, Shelters), Polar regions, Maintenance equipment, Construction, Design, Transportation, Snow vehicles, Tractors, Weight, Costs.

The report presents the concept and design of a one/two-stall repair shelter for the maintenance and repair of equipment up to Size 6 snow tractors. A canvas-covered, arch-framed structure with steel members was used for the design. The shop area was located adjacent to the repair areas for convenience and efficiency, and the entire shelter was mounted on skids for portability. The one-stall shelter and its outfitting will cost about $29,000; it will weigh about 30,500 pounds packaged for shipment. This cost is about 10 percent more and the weight is about 30 percent more than the portable maintenance shelter and its shop wanigan. The two-stall shelter and its outfitting will cost about $37,400; it will weigh about 41,400 pounds packaged for shipment. This cost is about 20 percent less and the weight is about 30 percent less than the temporary maintenance shelter. It is concluded that a prototype of the heavy-equipment field repair shelter should be evaluated at an outlying work center or construction project at an existing polar station. (Author)

AD-602 932 Div. 29, 13
OTS Prices: HC $2.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
POLAR STRUCTURE - DESIGN CONCEPT FOR A HEAVY-EQUIPMENT FIELD REPAIR SHELTER,
by G. E. Sherwood and E. H. Moser, Jr. 1 Jul 64,
34p
Proj. Y F015 11 01 105
NCEL N614

Unclassified report

general forms of optical computers were investigated. The first was based on an optically pumped scheme using neuristor-like lines produced from fiber optic lasers. This investigation included a theoretical study of energy flow, pulse shaping, material and pumping requirements, and experimental evaluation of suitable neuristor materials. The other form of optical computer investigated was based on electrical pumping and consisted of coupled laser resonators. This study was confined to determining the material requirements and device configuration. The final section of the report describes an experimental investigation of a fast light pulse generator and associated detection equipment necessary to test future materials for optical computers. (Author)

AD-602 671 Div. 30
OTS Prices: HC $1.00/MF $0.50

Boeing Scientific Research Labs., Seattle, Wash.
UNIFORM RANDOM NUMBER GENERATORS,
by M. Donald MacLaren and George Marsaglia.
Apr 64, 22p D1 82 0349, Boeing Math349
Unclassified report

Also available from the authors.

Descriptors: (*Digital computers, Pulse generators), (*Numbers, Sequences), Programming (Computers), Monte Carlo method, Tests, Statistical tests.

This paper discusses the testing of methods for generating uniform numbers in a computer--the commonly used multiplicative and mixed congruential generators as well as two methods. Tests proposed here are more stringent than those usually applied, because the usual tests for randomness have passed several of the commonly used procedures which subsequently gave poor results in actual Monte Carlo calculations. The principal difficulty seems to be that certain simple functions of n-tuples of uniform random numbers do not have the distribution that probability theory predicts. Two alternative generating methods are described, one of them using a table of uniform numbers, the other one combining two congruential generators. Both of these methods passed the tests, whereas the conventional multiplicative and mixed congruential methods did not. (Author)

AD-602 691 Div. 30
OTS Prices: HC $3.00/MF $0.75

National Cash Register Co., Dayton, Ohio.
SIMULATION AND EVALUATION OF PHONETIC SPEECH RECOGNITION TECHNIQUES. VOLUME V. SUMMARY REPORT,
by Klaus W. Otten. Apr 64, 60p NCR 11 1F2V
Contract AF33 657 9205, Proj. 4335, Task 433521
RTD TDR63 4005 V5
Unclassified report

Descriptors: (*Speech recognition, Simulation), (*Sound signals, Speech recognition), Speech representation, Speech, Analysis, Automatic, Programming (Computers), Language, Acoustic properties, Communication theory.

Efforts in recognizing speech at the acoustical level are described for both discrete phonemes and connected speech, as represented in a multidimensional recognition space. General properties of higher-order recognition methods are described, with emphasis placed on their dependence on a lower-order (acoustical) recognition method. (Author)

AD-602 693 Div. 30
OTS Prices: HC $4.00/MF $1.00

Westinghouse Defense and Space Center, Baltimore, Md.
MULTIPLE PROCESSING TECHNIQUES.
Final rept.,
Jun 64, 133p
Contract AF30 602 3417, Proj. 5581, Task 558109
RADC TDR64 186
Unclassified report

Descriptors: (*Data processing systems, Computers), (*Computers, Networks), Programming (Computers), Circuits, Coding, Integrated circuits, Diodes, Amplifiers, Design, Programming languages, Delay lines, Magnetic tape, Magnetic core storage, Computer logic, Coding, Typewriters, Transformers.

The report describes the design and operating principles of the SOLOMON II computer. The basic concept is similar to the Parallel Network Computer (SOLOMON). The Parallel Network Computer design consisted of 1024 processing elements operating in parallel on a single problem under the control of a central unit. It produced a system which, when applied to many problems, was much faster than present day computers. The SOLOMON II computer design has resulted in some logical changes to the Processing Elements developed for the Parallel Network Computer to produce a much faster computing element. These changes have resulted in a fixed word length and an extremely fast add and multiply operations. Also changes have been made in the control unit and some programming changes to produce a much faster operating system. (Author)

AD-602 705 Div. 30, 8, 16, 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
CYBERNETICS AND ITS DEVELOPMENT IN THE SOVIET UNION,
by Roger Levien and M. E. Maron. Jul 64, 40p
RM-4156PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Cybernetics, USSR), Communication theory, Bionics, Artificial intelligence, Digital computers, Brain, Nervous system, Physiology, Social sciences, Attitudes, Economics, United States, Theory, History.

The report is an introduction to the subject of cybernetics, with special reference to its origins and ramifications in the United States and its subsequent development in the Soviet Union. As a survey document only, it was prepared to provide a non-scientific audience with sufficient background to facilitate appreciation of the potential impact of cybernetics on science and society. As in the United States, scientific research, military applications, economic planning, education, industry, etc., are affected by developments in cybernetics. Following a brief introduction, the report traces the birth of cybernetics and sketches its early development and its growth and emergence in the West. Soviet cybernetics is also examined.

AD-602 708 Div. 30
OTS Prices: HC $4.00/MF $1.00

Litton Systems, Inc., Woodland Hills, Calif.
LOGICAL DETERMINISM IN NETWORK SYNTHESIS.
Rept. for Apr 63-Apr 64,

Columbia Univ., N. Y.
ON UPPER AND LOWER BOUNDS OF THE PROBABILITY OF FAILURE OF SIMPLE STRUCTURES UNDER RANDOM EXCITATION.
Technical rept. no. 1,
by M. Shinozuka. Dec 63, 26p

Unclassified report

Sponsored by Office of Naval Research, Air Force Materials Laboratory, Advanced Research Projects Agency.

Descriptors: (*Probability, Reliability), (*Structures, Reliability), (*Oscillators, Failure (Mechanics)), Linear systems, Stresses, Mechanical properties, Spacecraft, Atmospheric motion, Earthquakes, Motion, Equations, Statistical functions, Stochastic processes, Calculus of variations, Numerical analysis, Programming (Computers), Digital computers, Statistical analysis.

Upper and lower bounds are given for the probability P sub x (T; - lambda sub 1, lambda sub 2) (lambda sub 1, lambda sub 2>0) that a separable process x(t) crosses barriers at -lambda sub 1 and lambda sub 2 in the interval (O, T) under zero initial condition x(O) = O. The displacement of a damped oscillator with one degree of freedom due to a nonstationary Gaussian random input is investigated as an illustration of an analysis that does not require the input to be white noise. If failure of the system is assumed to occur when the absolute value of the displacement exceeds a critical value lambda, then P sub x (infinity; -lambda, lambda) is the probability of failure of the system. Under certain conditions, approximations for lower and upper bounds of P sub x (infinity; - lambda, lambda) are numerically evaluated with the aid of an electronic digital computer. The result shows that the present method estimates P sub x (infinity; - lambda, lambda) in a sufficiently narrow interval and over a sufficiently wide range of the probability values as required in reliability analysis. Applications to air and spacecraft subject to infrequent severe atmospheric turbulence and to structures subject to earth quake accelerations are suggested. (Author)

AD-602 577 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DESIGN OF MODELS, DIMENSIONS, AND SIMILARITY.
by L. I. Sedov. 4 May 64, 25p
FTD MT63 311; TT 64 11945

Unclassified report

Edited machine trans. of Priroda (USSR) 1953 [v. 42] no. 7, p. 13-21.

Descriptors: (*Mathematical models, Design), (*Models (Simulations), Design), Analysis, Scientific research, Mathematics, USSR.

AD-602 617 Div. 30, 28
OTS Prices: HC $2.00/MF $0.50

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
AN AUTOMATED FACILITY FOR FORCED-CHOICE SIGNAL DETECTION EXPERIMENTATION,
by William H. Watkins, Raymond S. Nickerson and John R. Schjelderup. Apr 64, 32p
Proj. 7682
ESD TDR64 383

Unclassified report

Descriptors: (*Signal generators, Design), (*Visual signals, Visual perception), (*Auditory signals, Auditory perception), Sensory perception, Display systems, Data processing systems, Input-output devices, Data processing systems, Computers, Tapes, Control systems, Anechoic chambers, Noise, Human engineering.

The facility described allows presentation of visual, auditory, or bisensory signals for the study of forced-choice signal detection. Means are provided for informing the observer, prior to each trial, of the signal mode he should expect on that trial. Considerable flexibility is provided for the scheduling of intermittent noise (aud. and/or vis.) within an observation interval. The facility includes an observer's station within an anechoic chamber and a control unit in a separate room. Data collection sessions are fully automated. The control system reads a paper tape input and produces a paper tape output. Input (stimulus scheduling) tapes are generated, and output (data) tapes are processed, by a PDP-1 computer. (Author)

AD-602 621 Div. 30, 5, 6, 12
OTS Prices: HC $2.00/MF $0.50

Lincoln Lab., Mass, Inst. of Tech., Lexington.
DIVISION 7. ENGINEERING.
Quarterly progress rept. for 1 Mar-31 May 64,
15 Jun 64, 30p
Contract AF19 628 500
ESD TDR64 337

Unclassified report

Descriptors: (*Radio astronomy, Antennas), (*Tracking, Airborne), (*Space communication systems, Satellites (Artificial)), Structural shells, Programming (Computers), Parabolic antennas, Radar equipment, Radiometers, Jet planes, Manned spacecraft, Atmosphere entry, Target discrimination, Engineering.

A continuing effort under the General Research Program concerns the mathematical analysis of paraboloidal shells and the development of computer programs and techniques for analyzing the large and accurately contoured antennas and supporting structures. The Haystack Hill antenna has been completely assembled and its parabolic surface adjusted in accordance with optical measurements taken after assembly. A continuing analysis is being made of measurement results for possible future adjustments. Meanwhile, system interconnections and the outfitting of radiometer and radar RF boxes are continuing. Instrumentation of the KC-135 aircraft for the PRESS program has entered its third and final stage. Two major efforts under the Space Communications Program are the experimental research satellite and the experimental terminal. Mechanical design, fabrication, and testing of the satellite structure, together with its support and ejection mechanisms, are proceeding on schedule. Additional tasks for the Apollo, AMRAD, and Re-entry Physics Programs are detailed. (Author)

AD-602 656 Div. 30, 8
OTS Prices: HC $6.00/MF $1.25

RCA Defense Electronic Products, Camden, N. J.
NEURISTOR LOGIC TECHNOLOGY.
Final rept.
Jun 64, 213p
Contract AF30 602 2761, Proj. 5581, Task 558101
RADC TDR64 123

Unclassified report

Descriptors: (*Lasers, Fiber optics), (*Neuristors, Optical materials), (*Digital computers, Lasers), Computer logic, Light pulses, Pulse generators, Light transmission, Absorption, Circuits, Optical properties.

The objective of the contract was to investigate the feasibility of high-speed computers in which all signals are in the form of optical energy. The major portion of the investigation was devoted to the concept, realization, and demonstration of an optical saturable absorber. Two

31. Ships and Marine Equipment

AD-602 426 Div. 31, 25
OTS Prices: HC $3.00/MF $0.50

Institute of Engineering Research, Univ. of California, Berkeley.
THIN-WALLED BOX GIRDER, THEORY AND EXPERIMENT,
by H. A. Schade. Jun 64, 55p NA-64 6
Contract NObs-90187, Proj. SF013 03 01, Task 1977
Unclassified report

Descriptors: (*Ship structural components, Beams (Structural)), (*Box beams, Ship structural components), Ship hulls, Structural parts, Models (Simulations), Loading (Mechanics), Deformation, Stresses, Theory, Model tests.

The thin-walled box girder is a convenient mathematical and physical model of the ship envelope structure. This paper gives a theory of response of such a girder to bending loading, and results of a series of tests on a large model. The loading produced highly unconventional strain patterns, and correspondence between theory and experiment is excellent. (Author)

AD-602 473 Div. 31, 9
OTS Prices: HC $4.00/MF $0.75

Hydronautics, Inc., Laurel, Md.
SUPERCAVITATING PROPELLERS HISTORY, OPERATING CHARACTERISTICS, MECHANISM OF OPERATION,
by Marshall P. Tulin. 1 Jun 64, 113p
Hydro TR127 6
Contracts NObs84720, Nonr3435 00, Proj. NR062 265
Unclassified report

Descriptors: (*Propellers (Marine), Cavitation), (*Cavitation, Propellers (Marine)), Propeller blades, Fluid dynamic properties, Thrust, Velocity, Effectiveness, Operation, Fluid flow, Ventilation, Lift, Drag, Momentum.

This paper contains discussions of: The historical development of supercavitating and ventilated propellers; their operating characteristics; and the mechanism of their operation. The operating characteristics are discussed largely in terms of four regimes of propeller operation for which definitions are given. These are: subcavitating, partially cavitating, supercavitating, and fully-supercavitating. The presentation of propeller characteristics in various forms and their meaning is discussed. The arched shape of the fully-supercavitating characteristic curve (k sub t vs. J) is described and explained. New phenomena which dominate the mechanism of operation of supercavitating propellers are described. These are cavity blockage and blade-cavity interference. Some quantitative theoretical results relating to these phenomena are presented. It is explained how these phenomena account for effects on thrust and efficiency, observed experimentally, but not previously understood. Fundamental differences in the mechanism of operation of sub and supercavitating propellers are revealed. (Author)

AD-602 494 Div. 31, 25
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
THEORETICAL AND EXPERIMENTAL DETERMINATION OF DAMPING CONSTANTS OF ONE- TO THREE-DIMENSIONAL VIBRATING SYSTEMS.
Research and development rept.
by Ralph C. Leibowitz and E. H. Kennard. Jun 64, 43p
DTMB 1770
Unclassified report

Descriptors: (*Ship structural components, Vibration), (*Vibration, Damping), Oscillation, Marine rudders, Equations, Energy, Frequency, Flutter.

Formulas are deduced for vibrating systems of one, two, and three dimensions. Undamped and damped free vibrations and harmonic forced vibrations are treated. Methods are proposed for calculating the damping constants from test observations. (Author)

AD-602 544 Div. 31, 9
OTS Prices: HC $4.00/MF $1.00

Southwest Research Inst., San Antonio, Tex.
VIBRATION CHARACTERISTICS OF THREE REPRESENTATIVE HYDROFOIL CONFIGURATIONS.
Final rept.
by Kishor D. Doshi and Guido E. Ransleben, Jr.
Sep 63, rev. Dec 63, 130p
Contract NObs88114X, Proj. 5712792
Unclassified report

Descriptors: (*Hydrofoils, Vibration), Model tests, Mathematical models, Loading (Mechanics), Fluid dynamic properties, Experimental data, Hydrodynamic configurations, Resonance.

Comparisons are made between theoretical and measured resonant frequencies for three representative hydrofoil configurations (Inverted Pi, Vee and Inverted Tee), with variable end conditions and depth of submergence in water. Theoretical calculations were based on influence coefficients, accounting for the 'apparent mass' effect of the water. Agreement on frequencies through the first six to eight modes of vibration for all configurations is generally excellent, being well within 10% in most instances and in no case greater than 18. 1%. Agreement on mode shapes is also generally good. (Author)

AD-602 618 Div. 31, 25
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
THEORETICAL AND EXPERIMENTAL DETERMINATION OF DAMPING CONSTANTS OF ONE- TO THREE-DIMENSIONAL VIBRATING SYSTEMS,
by Ralph C. Leibowitz and E. H. Kennard. Jun 64, 43p
DTMB 1770; AD 602 494
Unclassified report

Descriptors: (*Ship structural components, Vibration), (*Vibration, Damping), (*Damping, Vibration), Marine rudders, Flutter, Oscillation, Energy, Equations, Frequency, Algebra, Numerical analysis.

Formulas are deduced for vibrating systems of one, two, and three dimensions. Undamped and damped free vibrations and harmonic forced vibrations are treated. Methods are proposed for calculating the damping constants from test observations. (Author)

AD-602 681 Div. 31, 23, 29
OTS Prices: HC $2.00/MF $0.50

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
FLOTATION CAPABILITY OF PLASTIC AMMUNITION CONTAINERS,
by Charles C. Banta. Jul 64, 30p
PA TR3150
Unclassified report

by J. Robert Logan. Apr 64, 147p
Contract AF33 657 11052, Proj. 7062, Task 706206
AL TDR64 80

Unclassified report

Descriptors: (*Switching circuits, Synthesis), (*Computer logic, Networks), Input-output devices, Digital computers, Mathematical logic, Special functions (Mathematical), Factor analysis, Matrix algebra.

This report is concerned with network synthesis as it would exist under the philosophy of logical determinism. The basic working concepts of this philosophy are discussed. Some of the mechanics of handling data are reviewed with regard to input-output schemes and the formats which are employed. A synopsis of congruent partitioning provides a base for further development. Deterministic factoring is discussed, and illustratively applied to a sample system. Sequential networks are depicted as a result of further treatment of deterministic factoring. It is shown how novel logic elements can be processed by the basic congruent partitioning theory by its application to the sample case of exclusive OR circuitry. (Author)

AD-602 800 Div. 30
OTS Prices: HC $7.00/MF $1.75

David Taylor Model Basin, Washington, D. C.
PROCEEDINGS OF EXECUTIVE SEMINAR ON THE USE OF HIGH-SPEED CALCULATORS FOR THE SOLUTION OF NAVAL PROBLEMS, APPLIED MATHEMATICS LABORATORY, 7-9 SEPTEMBER 1960,
ed. by L. Layton, H. Smith, and L. Chatfield.
May 61, 370p
DTMB 1519

Unclassified report

A portion of this document is nonreproducible.

Descriptors: (*Symposia, Computers), (*Computers, Symposia), Digital computers, Naval research, Data processing systems, Ships, Design, Engineering, Mathematics laboratories, Nuclear reactors, Programming (Computers), Management engineering, Mathematics, Education, Mechanics, Structures, Launching, Guided missiles.

Contents: Computers, past and future, Trends in computer development, A report on computer technology outside the United States, General description of the larc computer system, General description of IBM 7090 system, Universal data processing system at DTMB, Computer data format translator, Bureau of ships computer program, Solution of naval problems on high-speed calculators, Mathematical calculation of shiplines, Solution of engineering problems, Nuclear reactor design calculations, Advanced programming progress, Management data analysis program, Advanced programming systems for management problems, Teaching of mathematics, NEL developed programming techniques, Use of computers for ship design and data reduction at hydromechanics laboratory, Applications of computers to problems in structural mechanics, Application of computers to missile launch problems. (Author)

AD-602 966 Div. 30, 28
OTS Prices: HC $3.00/MF $0.75

RCA Labs. Div., Radio Corp. of America,
Princeton, N. J.
TWO-MODE THRESHOLD LEARNING.
Rept. for May-Oct 63,
by J. Sklansky. May 64, 64p
Contract AF33 657 11336, Proj. 7233, Task 723305
AMRL TDR64 39

Unclassified report

Descriptors: (*Mathematical models, Bionics), (*Training, Mathematical models), (*Stochastic processes, Feedback), (*Bionics, Behavior), Adaptation (Physiology), Cybernetics, Pattern recognition, Retraining, Computers, Control, Adjustment (Psychology), Sensory perception, Simulation, Environment, Learning.

In certain 'threshold learning processes' (TLPs) associated with pattern recognition and sensory perception, the process of training an observer to recognize patterns or distinguish levels of sensory excitation may be modeled by a finite-state Markov chain. The statistics of the signals received by the observer move at random between two sets of parameters in a 'two-mode' TLP, modeled by a two-mode Markov chain. Using a probabilistic measure of effectiveness, the effectiveness of a 'simple incremental' feedback policy is shown to be greater for two-mode TLPs than for one-mode TLPs over a certain range of environmental and structural statistics. A method of designing periodic train-work schedules for two-mode TLPs is described. ('Train' and 'work' correspond to 'closed-loop' and 'open-loop' respectively.) In many real adaptive processes an 'RC approximation' of the train-work dynamics is applicable. For these processes the ratio of working time to retraining time, yielding a desired performance level, is maximized when the work-retrain period is made as small as possible. Many stochastic processes present modeling problems of near psychological complexity. Ways in which open-loop/closed-loop relationships can help the life scientist or engineer model adaptive stochastic processes by two-mode TLPs are indicated. (Author)

AD-602 969 Div. 30, 7, 8
OTS Prices: HC $3.00/MF $0.75

Southern Research Inst., Birmingham, Ala.
PARTICLE SIZE ANALYZER INSTRUCTION MANUAL.
20 Jun 62, 78p
Contract DA18 064CML2793

Unclassified report

Descriptors: (*Particle size, measuring devices (Electrical and electronic)), (*Measuring devices (Electrical and electronic), Particle size), Photometers, Pulse height analyzers, Design, Operation, Calibration, Maintenance, Instruction manuals.

This manual presents operation, calibration and maintenance procedures for six particle size analyzers. The instruments are composed of two housings, one containing a dual photometer with regulator and preamplifier circuits, and the other containing power supplies and pulse height analyzing circuits. Each instrument is provided with a plywood carrying case, which also contains a weather station house and collapsible legs for conversion to an all-weather operating stand. The photometers and analyzers are numbered P-1 through P-6 and A-1 through A-6, respectively, and are suitable for use in any combination. However, a given combination must be calibrated for particle size as a unit. The analyzers are designed to operate from external 6-volt batteries and to read out into four dual-channel Esterline-Angus Model 602 recorders. (Author)

32. Miscellaneous Arts and Sciences

AD-602 326 Div. 32, 12
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE PROPOSAL FOR A JOINT LUNAR EXPEDITION: BACKGROUND AND PROSPECTS,
by Alton Frye. Jan 64, 24p P-2808

Unclassified report

Descriptors: (*Space flight, Political science), (*Moon, Space flight), (*Political science, Space flight), Manned spacecraft, Foreign policy, United States, USSR, Economics, History.

AD-602 327 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
U. S. BUSINESS INTERESTS IN CUBA AND THE RISE OF CASTRO,
by Leland L. Johnson. Jun 64, 28p P-2923

Unclassified report

Descriptors: (*United States government, Economics), (*Cuba, Economics), (*Political science), Government (Foreign), Industries.

The paper explores the role that the large volume of U. S. investment in Cuba may have played in helping to shape political relations between the United States and Cuba during Fidel Castro's early years in power.

AD-602 346 Div. 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MAY-DAY ADDRESS OF THE MARSHAL OF THE SOVIET UNION,
by R. Ya. Malinovskii. 28 May 64, 12p
FTD TT64 535, TT 64 11872

Unclassified report

Unedited rough draft trans. from Pravda, Moscow (USSR) 1964, no. 123(16709) p. 1, 3.

Descriptors: (*Political science, Communism), Government (Foreign), USSR, Reports.

AD-602 357 Div. 32
OTS Prices: HC $4.00/MF $0.75

TRW Computers Co., Canoga Park, Calif.
AUTOMATIC ABSTRACTING OF RUSSIAN TEXT.
Final rept.
Jun 64, 104p TRW 432 402
Contract AF30 602 3202, Proj. 4594, Task 459401
RADC TDR64 155

Unclassified report

Descriptors: (*Abstracting, Automatic), (*Machine translation, Abstracting), Abstracts, Vocabulary, Programming (Computers), Language, USSR.

The report describes the development of a technique that is based on previously tested methods for English text. During the study an operating system was developed which produces automatic abstracts of Russian text by four basic methods (Cue, Key, Title, and Location) which were programmed for the IBM 7094. The programming involved the preparation of an edit program which prepares an edit tape of the text of Russian documents, a cue dictionary program which prepares a tape of a fixed word list, and an abstracting program which selects and outputs sentences of the Russian document in transliterated form. An example is given of a machine abstract produced by the combined method, using Cue, Title, and Location, which was found to be the preferred method. For purposes of comparison, an abstract (the 'target abstract') created manually according to a set of specific instructions is also presented. Also included are the conclusions resulting from the study and recommendations for future research. (Author)

AD-602 428 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
MACHINE LANGUAGE TRANSLATION STUDY.
Quarterly progress rept. no. 4, 1 Feb-30 Apr 64,
by W. P. Lehmann and E. D. Pendergraft. May 64, 37p
LRC 64P20
Contract DA36 039AMC02162E

Unclassified report

Descriptors: (*Machine translation, Language), (*Language, Machine translation), Special purpose computers, Programming (Computers), Data processing systems, Control systems, Armed forces research.

Progress is reported in the development of two generalized computer systems: the first designed to implement automatic translation of languages, the second to support basic research in linguistics. The systems complement each other in that basic programs prepared for each are applicable to, and needed in, the other. The common system design contains three sections: one for control, a second for language data processing, and a third for linguistic information processing. The first two sections are now operational. In the third, monolingual recognition programs for performing lexical and syntactic analysis and display were made operational. The programs are being used to verify English, German, Russian, and Chinese syntactic data. Substantial savings were achieved in machine time required for operation of the programs. (Author)

AD-602 433 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
A GENERALIZED COMPUTER SYSTEM FOR LANGUAGE TRANSLATION,
by E. D. Pendergraft. Mar 64, 34p LRC 64WA1
Contract DA36 039AMC02162E

Unclassified report

Descriptors: (*Machine translation, Language), (*Language, Machine translation), Programming (Computers), Data processing systems, Classification, Mathematics, Theory, Analysis.

The study is intended to provide a generalized computer system which will implement translation of natural languages by means of automatic programming techniques. The objective includes translation of other languages into English. An examination was made of general linguistic theories that would lend themselves to both linguistic and operational interpretations. A series of models (axiomizations of a general translation theory) was considered in the course of the study. In each instance, German and English corpora were used in an attempt to interpret the model in terms of definite linguistic structures. Three interrelated activities were studied: mathematical, programming and linguistic research. (Author)

Descriptors: (*Ammunition, Containers), (*Containers, Flotation), (*Life rafts, Containers), Plastics, Marine safety equipment, Buoyancy, Survival.

This report describes the method used and the results obtained in determining the ability of empty plastic ammunition containers of various sizes to float a man and/ or equipment. Rafts fabricated from these containers were also tested to determine their suitability as flotation devices. (Author)

AD-602 933 Div. 31, 27
OTS Prices: HC $1.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
FEASIBILITY STUDY OF PONTOON BARGE WATER JET PROPULSION AND STEERAGE,
by B. H. Bryner. 23 Jun 64, 9p
Proj. Y R011 01 01 069
NCEL N618

Unclassified report

Descriptors: (*Marine propulsion, Jet propulsion), (*Jet propulsion, Marine propulsion), Feasibility studies, Floats, Barges, Propulsion, Guidance, Reviews.

A study was made to determine the feasibility of applying water jet propulsion to pontoon structures and to ascertain the state-of-the-art of a suitable commercial pump and power unit. The results of the study indicate that a water jet propulsion system can be built which will have performance characteristics equivalent to those of the Model 06DH propeller unit while operating in deep water. Such a system will be superior to the 06DH unit in surf operations because the water jet system has few operational problems in the surf zone. This improved performance carries with it a penalty in the higher power required and fuel consumption. Adequate power units are available, but no suitable commercial pump can be obtained as a shelf item. Fabrication of a pump with the necessary operational characteristics is within the present state-of-the-art. (Author)

or choose what material the student receives on the basis of his answer to the last question. The computer-directed machine chooses instruction material by making a statistical evaluation of the student's total behavior in comparison with other students' total behaviors. This machine's statistics are actually changed as new students take the course. Such a teaching machine can perform very much like a human tutor who adjusts his presentation to fit the individual student's capabilities and who improves his teaching technique with each student. In this paper a technique is suggested for comparing teaching machines. The machine's tutorial functions would be fitted to a very general model of the tutorial teaching cycle. This allows the various automated instruction devices to be discussed in terms of a common model. An application of the computer-directed machine was made to a speed reading course. Preliminary experiments with this course indicate that the computer-directed machine can perform like a human tutor.

AD-602 700 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
DEVELOPMENT OF AUTOMATIC GRAMMARS,
by L. W. Tosh. Mar 64, 17p LRC 64WDA1
Grant NSF GN208

Unclassified report

Descriptors: (*Language, Data processing systems), (*Data processing systems, Language), Analysis, Computers, Programming (Computers), Simulation, Automatic.

The paper discusses the problem of grammar convergence in context-free phrase structure grammars designed for use in automatic computer analysis of languages.

AD-602 704 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WORLD GOVERNMENT AND THE CURRENT POLICIES OF THE NATIONS,
by Robert A. Levine. Jun 64, 20p P-2932

Unclassified report

Descriptors: (*Political science, History), (*Arms control, Theory), Disarmament, Government (Foreign), United States government.

World government is desirable, but is so far in the future that it cannot be an important consideration for the policy decisions of today. In many cases the desirable long-run goal does not conflict with the necessary short-run goals, and there is thus no problem. But cases can be found where the two do conflict, and in each of these 'the distant ideal of a free and open world disarmed under the rule of law should not divert us' from the problems of today.

AD-602 820 Div. 32, 26
OTS Prices: HC $4.00/MF $1.00

Case Inst. of Tech., Cleveland, Ohio.
AN OPERATIONAL THEORY OF OLIGOPOLY,
by Dilip K. Guha and S. Sengupta. 1964, 132p
Contract Nonr1141 11

Unclassified report

Prepared under grant for The Busch Foundation.

Descriptors: (*Operations research, Economics), (*Economics, Operations research), Costs, Commerce, Optimization, Industrial production, Mathematical models, Probability, Decision theory, Statistical functions, Statistical tests, Theory, Game theory.

A method has been developed for determining optimal price policies for an individual firm in an undifferentiated oligopoly without communication among the competitors. This method is 'operational': It is based upon verifiable specifications about (i) the institutional mechanism underlying the consumnation of transactions, (ii) the content and extent of information available to market participants, and (iii) the nature of competition. It does not require an analysis of the subjective attitudes of competitors. Given the above specifications, there exist for an individual firm well-defined and statistically testable probability or transition probability functions for its sales; these are parametrized by the price offered by the firm. An actual test has been successfully performed on artificially generated data. The model of transition probability has been shown to be a probabilistic version of the 'kinked demand' theory of oligopoly. Also, the degree of stability of empirical probabilities is shown to be a reflection of the state of coordination in competition. (Author)

AD-602 915 Div. 32, 12
OTS Prices: HC $7.00/MF $1.75

Air Force Academy, Colo.
REFLECTIONS ON SPACE: ITS IMPLICATIONS FOR DOMESTIC AND INTERNATIONAL AFFAIRS,
by Oscar H. Rechtschaffen, ed. Jan 64, 352p

Unclassified report

Descriptors: (*Astronautics, Space probes), (*Space probes, Astronautics), Sociology, Economics, Political science, United States government, Government (Foreign), Military policy, Spacecrafts, Space navigation, USSR.

Contents:
The challenge of space exploration
Space and its impact on the United States
The United States space effort: The cost and wisdom of the space race
The space effort of the U.S.S.R.
The military application of space
International law and cooperation in outer space (Author)

AD-602 948 Div. 32
OTS Prices: HC $1.25/MF $0.50

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS,
Jun 64, 50p
PB 181 563

Unclassified report

Also available on subscription $10.00/yr.

Descriptors: (*Corrosion, Metals), (*Troposphere, Radio transmission), Carbonates, Atmosphere, Atmospheric motion, Ultrahigh frequency, Very high frequency, X-ray diffraction analysis, Astrophysics, Chemistry, Mathematics, Metallurgy, Ceramic materials, Nuclear physics, Atoms, Solid state physics, Sound, Radio communication systems, Radar equipment.

Complete papers: Identity of the corrosion products of some metals in salt water; and Some methods for world-wide atmospheric radio duct measurement and prediction. Summaries are given of research in the following fields: atmosphere and astrophysics, chemistry, mathematics, metallurgy and ceramics, nuclear and atomic physics, radio, solid-state physics, and sound.

AD-602 527 Div. 32, 18
OTS Prices: HC $6.00/MF $1.25

Department of the Army, Washington, D. C.
DOCUMENTATION AND INFORMATION RETRIEVAL ASPECTS OF ARMY STUDIES. VOLUME II. ANNEX C TO THE ARMY STUDY SYSTEM. STUDY DOCUMENTATION AND INFORMATION RETRIEVAL,
by Charles J. Davis. Mar 63, 256p
Unclassified report

Descriptors: (*Documentation, Army research), (*Information retrieval, Army research), Subject indexing, Libraries, Reviews, Army operations, Operations research, Management engineering, Warfare, Military strategy, Military tactics, Logistics, Personnel management, Military training.

The documentation and information retrieval aspects of Army study effort is examined. Eight relatively independent study programs are described. These programs are found to be documented by some seventeen different information flow mechanisms. The identified information flow mechanisms and the manner in which the programs are managed constitutes a weak 'system' by documentation and information flow standards. A review of the 'state of the art' of library science, documentation and information retrieval trends and experience is made to identify a range of alternative improvements. A modest pilot system, to include a central reference library with a searching aid and a periodic bibliographic publication, is proposed. Alternative follow-on improvements are cited as candidates for further research. (Author)

AD-602 636 Div. 32, 18
OTS Prices: HC $6.00/MF $1.25

Arms Control and Disarmament Agency, Washington, D. C.
SOVIET DISARAMENT POLICY, 1922-1931,
by Robert W. Lambert. May 64, 225p
ACDA RR64 2
Unclassified report

This study is a historical analysis of Soviet disarmament policy.

Descriptors: (*Disarmament, USSR), (*History, Disarmament), Analysis, Warfare, Arms control, Political science, Armed forces (Foreign), Government (Foreign), Symposia.

The study is a historical analysis of Soviet disarmament policy from 1922, when Moscow first began to show serious interest in disarmament, to 1931, when arrangements for the Disarmament Conference were completed. In order to present the subject in the historical context of the period, certain information was included on other aspects of Soviet foreign policy, domestic developments in the USSR, and the attitudes of other major powers toward disarament, security, and related problems. Soviet policy is summarized and the author's conclusions are set forth at the end of the narrative. Texts of key Soviet papers and a bibliography are included.

AD-602 645 Div. 32, 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME SIMPLE MODELS OF ARMS RACES,
by Michael D. Intriligator. Apr 64, 26p RM3903PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Nuclear weapons, Arms control), Models *Simulations), Analysis, Warfare, Military strategy, Disarmament, Political science.

The study simplifies the complex structure of arms races in the real world by the assumption of two contenders, each having one policy variable: weapons stocks. With these simplifications, arms races are studied by means of reaction curves that indicate optimal weapons stocks, given the weapons stocks of the opponent. Both classical models are extended to allow for either a deterrent or an arms depriving strategy and constraints on weapons stocks. Strategic factors lead to stable points of mutual deterrence or explosive regions in which one side can disarm its opponent and the opponent cannot defer. Constraints lead to a high level equilibrium if both sides pursue an arms depriving strategy. If both sides then know the constraint of the opponent, a low level of weapons holdings would exist, guaranteeing for both the same desirable property of the high level equilibrium: both sides are prevented from attaining the capability to disarm the opponent. The analysis is suggestive only; it does not consider the many dimensions of policy. (Author)

AD-602 648 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
DEPENDENCY THEORY: A FORMALISM AND SOME OBSERVATIONS,
by David G. Hays. Jul 64, 46p RM-4087PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Language, Theory), Analysis.

A relatively new branch of linguistics called dependency theory is surveyed primarily from the viewpoint of the professional linguist. This is the first general treatment of the subject, in which results were collected from numerous sources, and the motivation as well as the structure of the theory are examined in some detail. Dependency grammars characterize the class of context-free languages, assigning to each sentence of a characterized language a tree structure with minimal syntactic units at the nodes. Both production and recognition procedures are given. Either transformational or stratified linguistic systems can be constructed on the basis of dependency theory; more attention is given to the latter possibility. Semantic and psychological considerations are cited as motivating specific features of the theory, but they are no more necessary as justifications for this theory than for others.

AD-602 660 Div. 32, 23
OTS Prices: HC $3.00/MF $0.75

Operations Research Center, Mass. Inst. of Tech., Cambridge.
A GENERALIZED TEACHING MACHINE DECISION STRUCTURE WITH APPLICATION TO SPEED READING.
Technical rept. no. 7,
by Theodore R. Strollo. May 64, 72p
Contract AF19 628 2407
Unclassified report

Descriptors: (*Teaching machines, Computers), Operations research, Programming (Computers), Equations, Statistics, Education, Learning, Tachistoscopes, Reading, Decision making.

A relatively new type of automated instruction called the 'computer-directed' teaching machine is discussed in this thesis. Typical present-day teaching machines either give every student the same instruction material

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33. Transportation

AD-602 331 Div. 33, 11
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
OVERALL DIMENSIONS AND CONDITIONS FOR TRANSPORTING DIMENSIONLESS LOADS,
by V. S. Bezruchko, Z.I. Goroza, and [Chernobrovkin].
17 Jun 64, 22p
FTD TT64 621, TT 64 11857

Unclassified report

Unedited rough draft trans. of mono. Spravochnik Dorozhnogo Mastera [Handbook for the Track Supervisor] Moscow, 1963, p. 44-60.

Descriptors: (*Railroad stock, Cargo), (*Railroad tracks, Loading (Mechanics)), Transportation, Standards, USSR.

AD-602 677 Div. 33, 18
OTS Prices: HC $5.00/MF $1.00

Stanford Research Inst., Menlo Park, Calif.
VULNERABILITY TO NUCLEAR ATTACK OF THE WATER TRANSPORTATION SYSTEMS OF THE CONTIGUOUS UNITED STATES,
by Benjamin V. Andrews and Harvey L. Dixon.
May 64, 195p
Contract OCD OS63 149, Proj. IMU4536 421

Unclassified report

Descriptors: (*Nuclear warfare, Damage), (*Water traffic, Vulnerability), Inland waterways, Ships, Piers, Personnel, Nuclear explosion damage, Reduction, Mathematical analysis, Civil defense systems.

This report contains an analysis of the vulnerability of the U. S. domestic water transportation systems to nuclear attack. The basic analytical procedure was to develop inventory data, assess the damage to the inventory for a range of nuclear attacks, identify those parts of the water transportation systems that appeared most vulnerable to nuclear attack, and suggest means to reduce the vulnerability. This basic procedure was followed for the four major components of the water transportation systems: (1) waterways, (2) vessels, (3) terminals, and (4) personnel. Statistical data are provided in the appendixes for each of these components. (Author)

AD-602 839 Div. 33, 2
OTS Prices: HC $4.00/MF $0.75

American Inst. for Research, Pittsburgh, Pa.
PILOT-TO-FORECASTER EVALUATION.
Evaluation rept. for 1 Jul-31 Dec 61,
by Alan J. Hoisman and Janice A. Schaeffer.
May 62, 118p
Contract FAA/BRD366

Unclassified report

Descriptors: (*Weather forecasting, Aviation safety), (*Air traffic control systems, Weather forecasting), (*Aviation safety, Weather forecasting), Pilots, Terminal flight facilities, Intercommunication systems, Military personnel, Civil aviation.

An operational evaluation of the Pilot-to-Forecaster test service is reported. The purpose of the evaluation was to assess the operational benefits to aviation and air traffic control from a program of meteorological information and assistance provided to airborne pilots and Air Route Traffic Control Centers. The approach of the study is reflected in the four general types of data collection techniques used. They were: observation, interviews, records of air-ground forecaster transmissions, and user questionnaires. The major results of the evaluation are: (1) The Service is used by general aviation, air carriers, and occasionally, military pilots; (2) General aviation uses the Service, over all, significantly more than do air carriers; and (3) On the average, the Service is used approximately 25 times a day by pilots. ARTC controllers use it both on a scheduled and on-demand basis. The primary conclusions drawn from the results are that the Service has been successful in meeting its aims and purpose, and that implementation of the Service should be nationwide. (Author)

AD-602 930 Div. 33, 1, 13
OTS Prices: HC $2.00/MF $0.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
FRICTION COEFFICIENTS BETWEEN TIRES AND PAVEMENTS SURFACES.
Final rept.
by H. Tomita. 15 Jun 64, 102p
Proj. Y F015 15 02 120
NCEL R303

Unclassified report

Descriptors: (*Friction, Pavements), (*Aircraft tires, Friction), (*Runways, Friction), Aircraft landings, Surface properties, Environmental tests, Rubber, Wear resistance, Safety, Vehicle brakes, Deceleration, Velocity, Meteorological parameters, Roads, Trailers, Concrete, Coatings, Abrasives, Traffic, Test equipment.

It was found that low friction coefficients were responsible for some aircraft accidents on naval airfields. Basic studies indicated that the actual friction coefficients between tires and pavement surfaces did not follow the basic laws of friction. The total frictional force included, in addition to the basic frictional force, a mechanical force resulting from the interlocking of the rubber with the aggregate particles protruding above the pavement surfaces. Various field-testing devices, developed by others, were used and compared in an effort to locate low-friction pavements and to standardize the method of measurement. One device still in the development stage showed promise of measuring friction coefficient under simulated conditions of landing aircraft. Many factors affecting the friction coefficient between tires and pavement surfaces were found through laboratory and field investigations. These factors were related to vehicle and aircraft operation, to tire design, and to types of pavement surfaces. The effect of these factors on the friction coefficients were varied. The individual effects of each factor were not found since many of the factors worked in combination. (Author)

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AD-602 510 DIV. 2

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AD-602 839 DIV. 33

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COMMON AVIATION WEATHER SYSTEM PERFORMANCE CRITERIA,
AD-602 418 DIV. 2

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AD-602 571 DIV. 12

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AD-602 874 DIV. 26

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ULTRASONIC WELDING EQUIPMENT FOR REFRACTORY METALS,
AD-602 663 DIV. 26

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PARTIAL-PENETRATION WELDED CONNECTIONS FOR ALUMINUM COMPRESSION MEMBERS,
AD-602 361 DIV. 17

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AERODYNAMIC CHARACTERISTICS OF STANDARD BALLISTIC MODELS MB-1 AND MB-2,
AD-602 749 DIV. 9

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AD-602 502 DIV. 9

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AD-602 695 DIV. 17

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BIBLIOGRAPHY OF PUBLICATIONS ON THE CHEMISTRY OF WOOD,
AD-602 302 DIV. 14
BIBLIOGRAPHY OF PUBLICATIONS ON STRUCTURAL SANDWICH, PLASTIC LAMINATES, AND WOOD-BASE COMPONENTS,
AD-602 351 DIV. 14

WOOD
INDUSTRIAL PRODUCTION
CHANGES IN MILL RUN HARDWOOD SAWLOG LUMBER GRADE YIELDS WHEN VENEER LOGS ARE WITHDRAWN,
AD-602 303 DIV. 14

WOOD
JOINING
NAILING DENSE HARDWOODS,
AD-602 305 DIV. 14

WOOD
PHYSICAL PROPERTIES
LIMITED EVALUATION OF PHYSICAL AND MECHANICAL PROPERTIES OF NEPAL ALDER GROWN IN HAWAII,
AD-602 306 DIV. 14
STRENGTH AND RELATED PROPERTIES OF WHITE FIR,
AD-602 307 DIV. 14

X BAND
MICROWAVE OSCILLATORS
A 10-MW, X-BAND TUNNEL-DIODE OSCILLATOR,
AD-602 720 DIV. 8

X RAYS
COHERENT SCATTERING
SMALL ANGLE X-RAY SCATTERING: METHODS AND CONSIDERATIONS,
AD-602 781 DIV. 25

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

2. Astronomy, Geophysics and Geography

AD-294 910 Div. 2
OTS price $1.10
OTS Prices: HC $1.00/MF $0.50
Lamont Geological Observatory, Palisades, N. Y.
ESTABLISHMENT OF A LONG PERIOD SEISMOGRAPH NETWORK UTILIZING MAGNETIC TAPE RECORDING.
Semiannual technical summary rept. no. 3, 1 Jun-30 Nov 62,
by Paul W. Pomeroy. 30 Nov 62, 4p
Contract AF19 604 8485, Proj. 8100; ARPA Order 180 61, Amend. 2, Task 2

Unclassified report

Descriptors: (*Seismographs, Magnetic recording systems), Magnetic tape, Data, Hawaii, Japan, Sweden, Peru, New York, Australia, Analysis, Data processing systems.

The contract concerns the establishment of a network of long-period seismograph stations utilizing magnetic tape recording. Four of these stations, lying outside the continental United States, were established and the long-period seismic data is currently being received at the Lamont Observatory for analysis and storage. The emphasis was on the installation of recording equipment and on the development finalization and presentation of analysis techniques and results.

AD-440 792 Div. 2
OTS Price HC $1.00/MF $0.50

Woods Hole Oceanographic Institution, Mass.
ANOMALOUS CONDITIONS IN THE SLOPE WATER AREA IN 1959,
by L. V. Werthington. May 64, 9p WHOI Ref-64 19
Contract Nonr2196 01

Unclassified report

Reprint from J. Fish. Res. Bd., Canada, 1964, v. 21, no. 2, p. 327-333.

Descriptors: (*Ocean currents, Atlantic Ocean), Gulf Stream, Newfoundland (Province), Thermal properties, Measurement, Oceanographic vessels, Bathythermograph data, Marine meteorology, Oceanology.

An oceanographic section made with the research vessel Crawford in June 1959 showed that the proportion of Labrador-Coastal Water to Slope Water at the meridian 57deg. 30 min. W was unusually large. Data from this section combined with bathythermograms taken elsewhere in the Slope Water area and direct deep current measurements suggest that there was an abnormal influx of cold water from the Labrador Basin in 1959. This suggestion is strengthened by the high incidence of coastal fog in the summer of 1959. It is suggested that the cause of this influx was an abnormal North Atlantic weather pattern in January 1959. (Author)

PB-163 063 Div. 2
OTS Prices: HC $1.00/MF $0.50

Radio Observatory, Calif. Inst. of Tech., Pasadena.
A CATALOGUE OF RADIO SOURCES IN THE GALACTIC PLANE,
by R. W. Wilson. 1963, 22p OWENS 1963-2
Contract Nonr 220 19

Unclassified report

Descriptors: (*Extraterrestrial radio waves, Catalogs), (*Catalogs, Extraterrestrial radio waves), Sources, Galaxies, Identification, Optical analysis, Ultrahigh frequency, Radio astronomy.

A list of the descrete radio sources found on a survey of the galactic plane at 960 Mc/s is presented. Position, flux density, size, and where available, previous radio designations and special index are given for each source. The optical field of each source has been examined and identifications and other comments are given. (Author)

PB-163 064 Div. 2
OTS Prices: HC $1.00/MF $0.50

Radio Observatory, Calif. Inst. of Tech., Pasadena.
A DISCUSSION OF THE DISK COMPONENT OF THE GALACTIC RADIO RADIATION,
by R. W. Wilson. 1963, 20p OWENS 1963-3
Contract Nonr220 19

Unclassified report

Descriptors: (*Radio astronomy, Galaxies), (*Galaxies, Radio astronomy), Disks, Extraterrestrial radio waves, Ultrahigh frequency, Models (Simulation), Hydrogen, Ionization, Thermal properties, Graphics.

A survey of the Galactic plane at 960 Mc/s is compared with the survey of Hill, Slee, and Mills (1958) at 85.5 Mc/s. The radiation is separated into thermal and non-thermal components using a method similar to the one employed by Westerhout (1958). The temperature spectral index of the non-thermal component is found to be about 2.4, which is smaller than the value of 2.7 used by Westerhout. Models of the spatial distribution of both components are computed and the distribution of ionized hydrogen differs from that found by Westerhout (1958) in that we find ionized hydrogen inside the '3 kiloparsec arm'. Using a cloud model, the mass of ionized hydrogen in the galaxy is found to be about 4 x 10 to the 7th power $M_\odot$, or 2.5% of the mass of neutral hydrogen found by Westerhout (1957). (Author)

PB-166 046 Div. 2
OTS price HC $4.00/MF $0.75

Institute of Polar Studies, Ohio State Univ. Research Foundation, Columbus.
GEOMORPHOLOGY AND GLACIAL GEOLOGY OF THE VICTORIA VALLEY SYSTEM, SOUTHERN VICTORIA LAND, ANTARCTICA.
by Parker E. Calkin. Mar 64, 111p
IPS 10, OSURF 1252-10
Grant NSF G17160, Proj. 1252

Unclassified report

Descriptors: (*Geology, Antarctic regions), (*Glaciers, Geology), Terrain, Ice islands, Drift, Stratigraphy, Geologic age determination, Petrology, Geological survey, Polar regions, Geography.

The main purpose of these studies was to examine and map land forms and surficial deposits of an ice-free valley area in order to gain a better knowledge of the glacial history of Antarctica as displayed by fluctuations of the ice at the edge of the continent.

hydrogen diffusion and heat transfer mechanisms on heterogeneous catalysis were investigated. The ability of the catalysts to effect the hydrogen-deuterium exchange reaction was studied to gain information concerning the basic conversion mechanism. The most advanced catalyst shows an activity nine times more effective, on a weight basis, than hydrous ferric oxide gel. (Author)

7. Electrical Equipment

AD-282 721 Div. 7, 8
OTS price HC $4.00/MF $1.00

Westinghouse Electric Corp., Baltimore, Md.
PHOTOEMISSION SOLAR ENERGY CONVERTERS.
Final rept., 8 Sep 59-1 Jun 61
by I. Limansky, A. S. Jensen, and E. F. Wood. 1 Jun 61, 175p
Contract DA36 039sc85248, Proj. 3A99 09 001,
ARPA order 80-59, Task 3A99 09 001 03

Unclassified report

Descriptors: (*Energy conversion, Photoelectric effect), (*Photoelectric effect, Solar cells), (*Solar cells, Feasibility studies), Spacecraft, Electric power production, Photons, Electron optics, Electrodes, Photocathodes, Vacuum systems, Economics.

The use of photoemission to convert solar photon flux into electrical power and the development of a high power-per-unit-weight photoemissive solar power converter suitable for use in space were considered. The groundwork was laid for the implementation of the WX-4209 close-spaced photogenerator and several interim WX-3964 experimental photogenerators were constructed, the latter displaying an increase in efficiency with a decrease in anode-to-cathode spacing, and an efficiency of 0.01 percent at the relatively large anode-cathode spacing of 70 mils. Analytical and technological studies were carried out which show that a 2-percent photoemissive solar converter should be potentially competitive with photovoltaic converters on a dollar per watt and watts per pound basis. (Author)

8. Electronics and Electronic Equipment

AD-403 417 Div. 8, 30
OTS price HC $2.00/MF $0.50

National Bureau of Standards, Boulder, Colo.
PERFORMANCE MEASUREMENTS ON THE MODEL NF 112, SERIAL NUMBER 211, NOISE AND FIELD INTENSITY METER.
Technical note no. 5
by A. H. Dove. 6 Feb 64, 43p, NBS 7648
Contract AF30 602 2385, Proj. 4540, Task 454001
RADC TDR63 81

Unclassified report

Descriptors: (*Radiofrequency interference, Measuring devices (Electrical and Electronic)), (*Measuring devices (Electrical and Electronic) Radiofrequency interference), Attenuators, Performance (Engineering), Intensity, Calibration, Stability, Voltage, Superhigh frequency, Antenna, Gain, Ultrahigh frequency, Bandwidth, Radiofrequency amplifiers.

The report reviews procedures and results of tests performed on the Model NF 112, Noise and Field Intensity Meter in the frequency range of 1 kmc to 15 kmc which affect field strength measurements. A number of curves are included, some which indicate the degree of error existing in the operating parameters. It covers tests and calibration procedures of the attenuators, rf selectivity, bandwidth measurements, meter scale tracking, overall linearity, image and IF rejection ratios, and shielding effectiveness. While the NF 112 performance measurements meet all of the requirements, there is much to be desired in the indicator circuitry and detector systems to simplify the techniques in making accurate field strength measurements. Further study of these parameters will be required because of the existing errors which are ever present when taking microwave measurements.

AD-413 376 Div. 8
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NEW METHOD OF FREQUENCY SYNTHESIS,
by C. Lindholm and S. Johnson. Jul 63, 44p
RM-3756PR
Contract AF49 638 700
N63 20901

Unclassified report

Descriptors: (*Frequency, Synthesis), Communication systems, Oscillators, Modulators, Piezoelectric crystals, Quartz, Radio transmitters, Mixers (Electronic).

A number representation scheme has been discovered which can be applied to frequency synthesizers such as are used in communication transmitters and receivers. The scheme permits a very large number of frequencies to be constructed from a much smaller set of fundamental (basis) frequencies. This approach may be applied to a variety of different communication requirements, such as airborne or portable equipment where weight or volume limitations are important, and wideband (spread spectrum) techniques. In the latter field the basis frequencies may be generated by other synthesis techniques, but mixed by the methods shown here. A distinction between nonlinear mixers and linear modulators for summing frequencies is described, and it is noted that for ease of separation of spurious products the linear modulator appears more desirable. Finally, the mathematical basis for the number representation scheme is described and tables useful to the design engineer are included, covering most cases of estimated practical value. (Author)

AD-437 812 Div. 8
OTS price HC $2.00/MF $0.50

Sperry Gyroscope Co., Great Neck, N. Y.
TRAVELING-WAVE TUBE MIXER.
Final rept., 1 Apr 61-31 May 63,
by L. Magill. Mar 64, 37p NA 8220 8366
Contract AF33 616 8074, Proj. 4156, Task 415604
RTD TDR63 4217

Unclassified report

Descriptors: (*Traveling wave tubes, Mixer tubes), (*Mixer tubes, Manufacturing methods), X band, V band, Voltage, Broadband, Molybdenum, Epoxy plastics, Seals, Electron guns, Cathodes (Electron tubes), Brazing, Aluminum, Ceramic materials, Attenuation, Alignment, Solenoids, Thermal expansion, Magnetic fields, Helixes.

The results of a research and development program are described for a two-helix traveling-wave-tube mixer capable of operation from 50 to 60 Gc. An experimental X-band mixer was constructed in a glass shell, but never tested because of difficulties in achieving satisfactory coupling. Lack of program time led to termination of work on this device and the initiation of design and construction of the full-frequency mixer. A full-frequency traveling-wave-tube mixer--having low ka, high frequency, low voltage, and wide bandwidth--was designed.

PB 166 067 Div. 2, 20
OTS price HC $3.00/MF $0.75

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
TIME STRUCTURE OF GROUND LEVEL AND SATELLITE COSMIC RAY INCREASES.
Scientific rept. no. 14,
by Sidney M. Bennett. 15 May 64, 82p, RAD TR64 12
Grant NSF C255

Unclassified report

Rept. on Antarctic Research and Data Analysis.

Descriptors: (*Cosmic rays, Solar flares), Protons, Space environmental conditions, Magnetic fields, Diffusion, Intensity, Surface area, Earth, Propagation, Time, Measurement, Satellites (Artificial), Monitors, Data, Astrophysics, Geophysics.

The morphology of solar-related terrestrial cosmic ray increases was studied using neutron-monitor, satellite, and riometer data. Data from numerous events were compared with the power law intensity decay. Results for five ground-level increases are mean m = 2.08, s to the second power = 0.01, and for all eight events studied, mean m = 1.97, s to the second power = 0.043. It is concluded that a power law decay with m = 2.0 is representative of the decay phase of moderate- to high-energy solar cosmic ray events. Two diffusion theories and a uniform magnetic field theory for propagation of solar particles in interplanetary space are discussed. The power law decay with exponent m = 2.0 corresponds to the theory which requires essentially uniform magnetic field strength along the path. It is suggested that the magnetic fields which guide solar cosmic rays arise in the solar centers of activity and not in the individual sunspots. Reanalysis of the delay time versus flare heliographic longitude supports the results of Obayashi and Hakura who found that a definite East-West asymmetry exists. We find that the delay time decreases markedly (and rather suddenly) when the flare region crosses the central meridian. (Author)

PB-166 068 Div. 2
OTS Prices: HC $3.00/MF $0.75

Rochester Univ., N. Y.
A HEURISTIC MODEL FOR THE VARIATION WITH RIGIDITY OF THE COSMIC RAY CHARGE SPECTRUM,
by M. F. Kaplon and G. Skadron. 12 Jun 64, 62p URPA 39
Grants AF AFOSR439 63 and NSF GP1372

Unclassified report

Descriptors: (*Cosmic rays, Intensity), (*Supernovae, Cosmic rays), Nuclear particles, Mathematical models, Magnetic fields, Charged particles, Scattering, Nuclei, Particle spectra.

An idealized model based on the supernova origin of cosmic radiation is proposed to account for the variation with rigidity of the cosmic ray charge spectrum. It is assumed that a supernova explosion results in the injection of a pure power law spectrum and a composition relatively rich in heavy nuclei. Particles are confined within a volume local to the source region by a magnetic boundary resulting in a rigidity dependent coefficient of reflectivity; this yields a source region path length varying inversely with rigidity. As a result, the differential spectra of particles escaping from the boundary into the galaxy are determined by the reflectivity; and as a result of the nuclear interactions in the source region, the composition varies with rigidity. The additional effect of intragalactic motion is taken into account and the differential rigidity spectra, as a function of composition at the earth, are calculated. Predictions for the H/M, L/M and He3/He ratios as a function of rigidity as well as the differential rigidity spectra are compared with experiment and are not in disagreement with the available data. The limitations and plausibility of the model are summarized and discussed. (Author)

PB-166 070 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Woods Hole Oceanographic Institution, Mass.
ON THE FORMULAS FOR CORRECTING REVERSING THERMOMETERS,
by Freeman K. Keyte. 1964, 22p WHOI Ref64 29
Grant NSF GP821

Unclassified report

Descriptors: (*Thermometers, Corrections), Oceanology, Mercury, Glass, Environment, Calibration, Marine meteorology, Equations, Temperature sensitive elements, Hydrostatic pressure.

The problem of differences in temperature readings on the oceanographic reversing thermometer is discussed. Algebraic calculations are made for correcting reversing thermometers.

PB-181 711 Div. 2
OTS price HC $3.00/MF $0.75

SOVIET RESEARCH ON ATMOSPHERIC TURBULENCE AND DIFFUSION,
by H. A. Panofsky and A. K. Blackadar. Aug 64, 63p
PAL 64 3

Unclassified report

Descriptors: (*Atmospheric motion, Reviews), Theory, Propagation, Atmospheric temperature, Wind, Clouds, Aircraft, Equations, Sound, Light, Bibliographies, Meteorological parameters, Fluid dynamic properties, Instrumentation, Radiowaves, Velocity, Turbulence, Diffusion, USSR.

Contents:
Turbulence fluctuations and their measurement
Wind profiles and exchange coefficients
Turbulence in clouds
Clear-air turbulence and technology of aircraft measurements
Effect of turbulence on wave propagation
Atmospheric diffusion

4. Chemistry

AD-431 204 Div. 4, 13, 25
OTS price HC $6.00/MF $1.25

Air Products and Chemicals Inc., Allentown, Pa.
INVESTIGATION OF THE PARA-ORTHO SHIFT OF HYDROGEN
Rept. for Jul 60-Mar 62,
by R. G. Clark, J. F. Kucirka, A. Jambhekar, and G. E. Schmauch. Jul 62, 202p
Contract AF33 616 7506, Proj. 3048, Task 30193
ASD TDR 62 833 P1

Unclassified report

Descriptors: (*Liquefied gases, Hydrogen), (*Hydrogen, Phase studies), (*Cryogenics, Refrigeration systems), Refrigerants, Heat transfer, Catalysts, Particle size, Surface area, Deuterium, Exchange reactions.

Investigations of the low-temperature, heterogeneous catalysis of the para-ortho shift of hydrogen for the recovery of the endothermic heat of conversion as low-temperature refrigeration are reported. The studies included a comprehensive literature survey, the design and construction of facilities for testing catalytic activities at cryogenic temperatures and a survey of commercial catalysts to determine the catalyst properties which enhance conversion. The effects of catalyst particle size and surface area were investigated. Such parameters as hydrogen pressure and conversion temperature were also studied. The effects of

12. Guided Missiles

PB 181 709 Div. 12
OTS price HC $7.04/MF $2.00

Bendix Corp., Southfield, Mich.
APPLICATION OF HIGH MOMENT-PRODUCING TECHNIQUES FOR CONTROL OF A MANNED SPACE VEHICLE.
Final rept.
by R. H. Larson. Mar 64, 404p
Contract AF33 657 10998, Proj. 8225, Task 822503
FDL TDR64 32

Unclassified report

Descriptors: (*Attitude control systems, Manned spacecraft), (*Manned spacecraft, Attitude control systems), *Reentry vehicles, Maneuverability, Rendezvous trajectories, Transfer trajectories, Flight control systems, Thrust vector control systems, Aerodynamic control surfaces, Secondary injection, Control jets, Gyroscopes, Spacecraft docking, Simulation, Analog systems, Torque, Retro rockets, Lift, Descent trajectories, Flywheels, Flaps, Servomechanisms.

High moment-producing techniques are applied to the attitude control of manned space vehicles which perform orbital transfer, rendezvous, and lifting re-entry maneuvers. The specific accomplishments were: (a) Establishment of control system, subsystem and component requirements for critical vehicle flight phases. (b) Analysis of promising techniques for performing the flight control functions required during the various maneuvers. A hypothetical vehicle was selected and its space mission was analyzed to determine the attitude control requirements. The rendezvous and re-entry maneuvers were found to be especially demanding on the attitude control system. (Author)

13. Installations and Construction

AD-286 695-S1 Div. 13, 2
OTS price HC $1.00/MF $0.50

Air Weather Service, Scott AFB, Ill.
ESTIMATING THE PROBABILITY OF OPERATIONALLY-CRITICAL WIND SPEEDS AFFECTING AN AIR BASE DURING THE PASSAGE OF A TROPICAL CYCLONE.
Amendment no. 1
by H. S. Appleman. Jan 63, 8p
AWS TR164 A1

Unclassified report

Descriptors: (*Military facilities, Air force), (*Air force operations, Meteorology), (*Tropical cyclones, Weather forecasting), (*Graphics, Probability), Wind, Damage.

This amendment contains zonal total and instantaneous probability graphs for the Atlantic-Caribbean area to replace figures 6 and 7 in AWSTR 164 (AD-286 695). These new graphs were obtained with the aid of results from a forecast-error study for various zones in the Atlantic-Caribbean area made by the Naval Weather Research Facility at Norfolk.

14. Materials (Non-Metallic)

AD-400 990 Div. 14, 13, 26
OTS price HC $5.00/MF $1.00

Heil Co., Milwaukee, Wis.
RESEARCH AND DEVELOPMENT STUDY ON A REINFORCED PLASTIC CONTAINER. PHASE I, PRELIMINARY DESIGN PHASE, VOLUMES I AND II.
by Donald E. Meyer, Terje Wiersholm, and John F. Reeves. Dec 62, 152p
Contract DA44 177TC672, Proj. 9R91 03 005
TRECOM TR62 105V1 and 2

Unclassified report

Descriptors: (*Plastics, Containers), (*Containers, Plastics), (*Laminated plastics), Packing materials, Packaging, Structures, Structural properties, Design, Cargo, Test methods, Reinforcing materials, Standards, Stresses, Sandwich construction, Fibers (Synthetic), Bibliographies, Models (Simulations).

Force analysis of general cargo container service is presented and related to plastic container design. Also included are results of evaluations including laboratory test of certain materials and techniques, culminating in a proposed design for a container structure. Bibliography contains 37 items.

AD-400 991 Div. 14, 13
OTS price HC $3.00/MF $0.75

Heil Co., Milwaukee, Wis.
RESEARCH AND DEVELOPMENT STUDY ON A REINFORCED PLASTIC CONTAINER. VOLUME III: TEST EVALUATION PART I, PHASE 3.
by Donald E. Meyer, Terje Wiersholm, and John F. Reeves. Dec 62, 86p
Contract DA44 177tc672, Proj. 9R91 03 005
TRECOM TR62 105

Unclassified report

Descriptors: (*Plastics, Containers), (*Containers, Plastics), (*Laminated plastics), (*Packing materials), Structures, Structural properties, Packaging, Design, Stresses, Reinforcing materials, Force (Mechanics), Test methods, Standards, Fracture (Mechanics), Loading (Mechanics), Cargo.

Force analysis of general cargo container service is presented and related to plastic container design. Also included are results of evaluations including laboratory test of certain materials and techniques, culminating in a proposed design for a container structure. (Author)

AD-437 997 Div. 14, 7
OTS price HC $1.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
CHARACTERIZATION OF CELLOPHANE AS AN IONIC BARRIER.
by Claudia C. Evans. 11 Mar 64, 23p
NOL TR63 225

Unclassified report

Descriptors: (*Cellulosic plastics, Battery separators), (*Battery separators, Cellulosic plastics), Ions, Gels, Electrolytes, Electrolytic cells, Chemical bonds, Silver compounds, Zinc, Oxides, Potassium compounds, Membranes, Physical properties, Chemical properties, Molecular structure, Hydroxides, Diffusion, Separation.

Cellophane, a gel developed from crystalline alpha-cellulose, has been used as an ionic barrier (battery separator) in electric batteries with outstanding success for many years.

The primary technical difficulty arose from the use of molybdenum in the tube shell and support structure. Molybdenum solved the problem of thermal-expansion differences between the tube shell and ceramic supports, but made brazing, plating, and machining difficult. All brazing efforts failed, so a device was constructed and sealed by means of an epoxy adhesive. (Author)

PB-166 069 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Microwave Devices Lab., Univ. of Utah, Salt Lake City.
ELECTRON BEAM COMPRESSION WITH ELECTRIC AND MAGNETIC FIELDS,
by Kenneth I. Talbot and Curtis C. Johnson. Jun 64, 66p
MDL NSF6
Grants NSF G15017, NSF GP843

Unclassified report

Descriptors: (*Electron beams, Focusing), Electron guns, Thermionic emission, Magnetic fields, Electric fields, Electrons, Velocity, Space charges, Mathematical analysis, Partial differential equations, Programming (Computers), Microwave equipment.

For microwave device and micro-welding applications, electron beams with small diameters and large current and power densities are required. Electron beams of this type may be produced by a compression device employing both electrostatic and magnetic fields. The greatest current density obtained for a point focused electron beam has been 7000 amps/sq cm. This paper will present design and test information on a cylindrically focused beam with a current density of 2500 amps/sq cm. The beam entrance conditions and the magnetic field intensity at the cathode are critical parameters in the gun design. Under proper conditions, the beam produced will be well focused with little ripple, but if these conditions are not properly met, the beam may become severely unstable. The case of zero magnetic field at the cathode has been investigated for various entrance parameters. This paper will present theoretical and experimental data which describes the effects of magnetic flux at the cathode and thermal velocities. (Author)

PB-181 698 Div. 8
OTS price HC $1.00/MF $0.50

Bureau of Naval Weapons, Navy Dept., Washington D. C.
ELECTRONIC CONTROL AMPLIFIER TEST SET AN/ASM-107. PART NO. 420907-01-01.
Instrument Calibration Procedure Manual.
15 Mar 64, 14p
NAVWEPS 17 20QT06

Unclassified report

Descriptors: (*Calibration, Instruction manuals), (*Test sets, Calibration), (*Servo amplifiers, Test sets), (*Electronic equipment, Servo amplifiers), Amplifiers, Flight control systems, Test equipment (Electronics), Measuring devices (Electrical and electronic), Potentiometers.

This manual contains calibration instructions that will enable calibration personnel to determine whether the equipment is operating within the prescribed specification limitations. The electronic control amplifier test set AN/ASM-107 (hereinafter referred to as the test instrument), part no. 420907-01-01, provides the necessary power, interconnections and indicators to check out servo and calibration modules used in electronic control amplifier AM-3082/ASW-20 (part of automatic flight control set AN/ASW-20). The test instrument consists of power circuits which provide the operating and signal voltages for testing the modules, monitoring circuits for internal and external monitoring of voltages, and module checkout circuits which provide controlled excitation voltages and simulated signals for modules under test.

10. Fuels and Combustion

AD-292 988 Div. 10, 25
OTS HC $3.00/MF $0.50

Philco Research Labs., Newport Beach, Calif.
AN EXPERIMENTAL PROGRAM FOR OBTAINING THE THERMODYNAMIC PROPERTIES PROPELLANT COMBUSTION PRODUCTS.
Quarterly technical rept. no. 2,
by D. L. Hildenbrand, L. P. Theard, W. F. Hall, F. Ju, and F. S. La Viola. 15 Dec 64, 54p U-1955
Contract NOw61 0905c, ARPA Order 22 6218

Unclassified report

Includes: The Vaporization Behavior of Boron Nitride and Aluminum Nitride, by D. L. Hildenbrand and W. F. Hall.

Descriptors: (*Combustion products, Propellants), (*Thermodynamics, Combustion products), (*Vaporization), Boron compounds, Aluminum compounds, Nitrides, Lithium compounds, Fluorides, Thermochemistry, Mass spectroscopy, Vapor pressure, Heat of sublimation.

The vapor pressure of elemental boron has been measured in the range 2300 to 2425K by a differential torsion technique which gives the sum of the boron and boron carbide vapor pressures and also the vapor pressure of boron alone. Results obtained to date yield delta H298 = 136.1 kcal/mole for boron, in good agreement with a corresponding value derived from boron carbide decomposition pressures. The equilibrium between A1F3, A1 and A1F is being studied by both torsion-effusion and mass spectrometric techniques. Results obtained by the two different methods are in good agreement, and indicate delta Hf298 = -61.1 kcal/mole for A1F (g). It appears that hole-size effects may be significant in the torsion measurements; this effect is being explored. A re-examination of the vaporization behavior of the Li-A1-F system has been made and a new interpretation is given which is more consistent with all the available phase equilibrium data.

PB-166 058 Div. 10, 4
OTS price HC $5.00/MF $1.00

Bituminous Coal Research, Inc., Monroeville, Pa.
A STUDY OF ULTRAFINE COAL PULVERIZATION AND ITS APPLICATION.
Final rept., Oct 61-Oct 63,
by R. A. Glenn and R. J. Grace. Oct 63, 176p
Contract 14 01 0001 226
OCR RDR-5

Unclassified report

Descriptors: (*Coal, Processing), Milling machines, Particle size, Separation, Gas-generating systems, Mixtures, Gases, Transport properties, Combustion, Furnaces, Boilers, Feasibility studies, Economics, Chemical engineering, Fuels.

The overall coal beneficiation and transport system under development by the Office of Coal Research is centered around the concept of an integrated coal preparation and transport-gas generating system employing the latest and most modern processes and equipment. First, a techno-economic evaluation of the application of pulverized coal-firing to small commercial and industrial installations was made to establish the current status and potential of ultrafine coal in this field. Second, a program of having ultrafine coal custom ground to specifications in available commercial-scale equipment was conducted to obtain first-hand data from the manufacturer on the economics of ultrafine pulverization of coal. Custom grinding tests by four equipment manufacturers were made using three basic types of mills, namely, the ball mill, the fluid energy mill, and the vibro energy mill. Third, the closed-circuit ball mill and the steam-driven fluid energy mill were chosen for further evaluation and development in the laboratory under closely controlled conditions.

by A. W. Anderson. 28 Feb 62, 21p
Contract DA19 129qm1517 Proj. 7 84 01 002
DSSC S547

Unclassified report

Descriptors: (*Microorganisms, Radiation effects), (*Clostridium botulinum), (*Food, Radiation effects), Ionization, Beef, Tolerances (Physiology), Bacteria, Containers, Spores, Toxicity, Heating, Gamma rays, Chlorides, Sodium compounds, Viability.

Mild heat treatment applied after irradiation reduced the survival of Clostridium botulinum. Sodium chloride, calcium chloride, citrate, nitrite, mustard oil (allyl isothiocyanate), nutmeg, sodium citrate and Versene reduced the dose of irradiation required to inactivate Clostridium botulinum spores (strains A-5 and B-115) in raw ground beef. Of those listed above sodium chloride, nitrate and nitrite were the most effective. (Author)

AD-434 801 Div. 16, 1
OTS price HC $3.00/MF $0.75

Iowa State Univ., Iowa City.
WATER RECOVERY BY FREEZE DRYING USING MICROWAVE ENERGY.
Rept. for Jun 62-Aug 63
by A. F. Vetter and Karl Kammermeyer. Dec 63, 66p
Contract AF33 657 9263, Proj. 6373, Task 637304
AMRL TDR63 130 N64 18789

Unclassified report

Descriptors: (*Water, Recovery), (*Space environmental conditions, Water), (*Urine, Freeze drying), Life support, Closed ecological systems, Taste, Odor, Expanded plastics, Foams, Weightlessness, Gravity (Artificial), Microwave, Space flight.

The recovery of water from urine by the freeze drying process, using a microwave energy source is investigated. Chemical and biological contaminants are well below the standards established. Taste and odor of the reclaimed water are satisfactory for drinking purpose without additional treatment. Various foam and sponge materials for use in zero-gravity environments were tested. Yield rate studies were performed, using such variables as power input, geometrical configuration, use of sponge and foam materials, and comparison of pre-frozen and vacuum frozen samples. A suggested apparatus design is presented and space and power requirements are discussed. (Author)

OTS SB-528 Div. 16, 28, 32
OTS price $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
AGING (PHYSIOLOGY) (INCLUDES GERIATRICS, GERONTOLOGY, LONGEVITY).
Selective Bibliography, corrected version
1964, 12p
OTS SB528

Unclassified report

Descriptors: (*Aging (Physiology), Bibliographies), (*Bibliographies, Aging (Physiology)), Abstracting, Personality, Behavior, Psychology, Biochemistry, Mental disorders, Radiation effects, Animals, Performance (Human), Drugs, Test methods, Physiology, Psychophysiology, Anatomy, Medical examination, Diseases, Morphology (Biology), Therapy.

Lists 116 domestic and foreign references on physiological and psychological aspects of aging. Includes reports on: geriatrics; gerontology; longevity; age and behavior; personality development; age morphology; biochemistry of aging; physical and mental infirmities connected with old age; causes of premature aging; effects of radiation on aging; studies of the aging process in rats, mice, monkeys, rabbits, sheep, as well as humans.

PB-166 059 Div. 16, 1
OTS Price HC $1.00/MF $0.50

Aerospace Crew Equipment Lab., Naval Air Engineering Center, Philadelphia, Pa.
DETERMINATION OF TEST INSTRUMENTATION REQUIREMENTS FOR BIOLOGICAL AIRBORNE AND ASTRONAUTICAL TESTS.
Letter rept.
28 Mar 60, 10p
Proj. TED NAM AE1403.1
AD 234 091

Unclassified report

Descriptors: (*Electrocardiography, Astronauts), (*Astronauts, Electrocardiography), Manned spacecraft, Test equipment, Adhesives, Clothing, Pressure suits, Thermocouples, Test methods, Space environmental conditions, Electrodes.

A description of electrodes suitable for obtaining ECG records when worn under protective clothing during prolonged exposures in adverse environmental conditions has been given. The manner in which these electrodes were applied to the surface of the body was also indicated. (Author)

PB-181 707 Div. 16, 30
OTS price HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
DETERMINATION OF HYDRAZINE AND 1-METHYLHYDRAZINE IN BLOOD SERUM.
Rept. for Jun 62-Aug 63.
by Barbara A. Reynolds and Anthony A. Thomas. Apr 64, 15p
Proj. 6302, Task 630202
AMRL TDR64 24

Unclassified report

Descriptors: (*Hydrazine, Blood serum), (*Blood serum, Hydrazine), (*Methyl hydrazines, Blood serum), Toxicity, Poisoning, Quantitative analysis, Chemical analysis, Rats, Dosage.

A simple procedure is described for measuring microgram amounts of hydrazine in the blood serum of rats. The procedure, with a minor modification, can be used for measuring microgram amounts of 1-methylhydrazine. The report presents calibration ranges of 0.5-5.0 micrograms ml and 0.5-10.0 micrograms/ml of hydrazine and 1-methylhydrazine, respectively. Data are presented on the dose-blood-level relationship of hydrazine and 1-methylhydrazine in rats following intraperitoneal injection. Minimum detectable dose levels were 0.6 mg/kg and 3.0 mg/kg of hydrazine and 1-methylhydrazine, respectively. (Author)

17. Metallurgy

AD-414 462 Div. 17, 26
OTS price HC $4.00/MF $0.75

Du Pont de Nemours (E. I.) and Co., Inc., Baltimore, Md.
COLUMBIUM ALLOY EXTRUSION PROGRAM. PHASE V: TUBING PROGRAM.
Final rept., 15 Jul 62-15 Jun 63,
by E. V. Peterson. Jul 63, 118p
Contract AF33 600 40700, Proj. 7 775
ASD TDR63 637 V2

Unclassified report

Descriptors: (*Niobium alloys, Extrusion), (*Pipes, Niobium), Mechanical properties, Manufacturing methods, Microstructure, Metallography, Tensile properties, Reduction, Chemical analysis, Physical properties, Heat treatment, Dies, Stresses, Glass, Abrasive blasting, Surface

Understanding the mechanism of the cellophane action in ionic barrier applications could lead to the development of superior ionic barriers. A literature survey has been conducted on the characteristics of cellophane as related to electrochemical cell barrier applications. The physical or chemical bonding of ions in electrolyte solutions to molecules in the membrane, or the catalytic complexing of undesirable ions appear to be much more important in the effective operation of cellophane as a barrier than the filtering or capillary diffusion actions, although these latter actions cannot be ignored. (Author)

PB-166 063 Div. 14, 8, 25
OTS price HC $2.00/MF $0.50

New Jersey Ceramic Research Station, Rutgers Univ., New Brunswick.
INORGANIC DIELECTRICS RESEARCH.
Progress rept. no. 3, 1 Mar-1 Jun 61,
by E. J. Smoke, C. J. Phillips, Y. S. Kim, D. R. Ulrich, and P. Whelan. 1 Jun 61, 45p
Contract DA36 039sc85385

Unclassified report

Descriptors: (*Dielectrics, Inorganic compounds), (*Ceramic materials, Dielectrics), (*Ferroelectric materials, Dielectrics), Crystal structure, Microwave equipment, Glass, Boron compounds, Phosphates, Silicon compounds, Electrical properties, Dielectric properties, Barium compounds, Titanates, Microstructure, X-ray diffraction analysis, Flame spraying, Crystallization, Extrusion.

Under Low Loss Microwave Dielectrics, additional information pertaining to the ultra low loss boron phosphate-silica type composition, both as a glass and as a devitrified body, is presented. This includes electrical properties determined between 1 and 33 mc/sec over the temperature range 25 to 300C, and between 1 and 10,000 mc/sec at room temperature. Resistivity vs temperature and expansion vs temperature properties are also reported. Under Devitrification Studies of Ferroelectric Materials, pure barium titanate has been made into a glass which is pulverized, fabricated into specimens and fired. The specimens approach maturity exhibiting dielectric constants between 500 and 1200 over the temperature range of 25 to 150C. The Curie temperature is increased from 120 to 142C. Hot pressing of the powdered glass results in a higher dielectric constant but the Curie temperature is unaffected. DTA studies are also reported. An Evaluation of the High Temperature Microscope in devitrification studies is also presented. Four previously evaluated compositions were studied for the effect of temperature on crystallization including size, shape, and content. Series of photomicrographs illustrating these effects are presented. Under High Temperature Extrusion of Barium Titanate the status of the effort is reported. (Author)

PB-166 064 Div. 14, 8, 25
OTS price HC $2.00/MF $0.50

New Jersey Ceramic Research Station, Rutgers Univ., New Brunswick.
INORGANIC DIELECTRICS RESEARCH.
Progress rept. no. 4, 1 Jun-1 Sep 61,
by E. J. Smoke, C. J. Phillips, D. R. Ulrich, C. Breen, and R. C. Pitetti. 1 Sep 61, 36p
Contract DA36 039sc85385

Unclassified report

Descriptors: (*Dielectrics, Inorganic compounds), (*Ceramic materials, Dielectrics), (*Ferroelectric materials, Dielectrics), Microwave equipment, Lanthanum compounds, Oxides, Aluminum compounds, Silicon compounds, Phase studies, Barium compounds, Titanates, Glass, Heat treatment, Electrical properties, Dielectric properties, Refractive index, Surface-active substances, Spheres, Flame spraying, Boron compounds, Nitrides.

Under Low Loss Microwave Ceramic Dielectrics the principal objective is to attain a dielectric constant between 12 and 15 and a maximum power factor of 0.0004 in the microwave frequency range. Compositions containing lanthanum oxide, alumina and silica show promise. A discussion of the compositional area under study is presented and the problems encountered in preparing and firing bodies. Under Devitrification Studies of Ferroelectric Materials the glass made from 100% barium titanate (capacitor grade) has been fabricated into bodies, fired and evaluated as to ceramic properties, and electrical properties vs temperature. The Curie temperature has been raised from 120C to 141C with an increase of as little as 50% in dielectric constant. Barium titanate (C. P. grade) has been flame sprayed into a glass and some of its properties are reported. Under Low Loss Boron Nitride Ceramic Dielectrics a procedure is reported by which the wettability of a glass on boron nitride can be determined quite readily. (Author)

PB-166 065 Div. 14, 8, 25
OTS Price HC $2.00/MF $0.50

New Jersey Ceramic Research Station, Rutgers Univ., New Brunswick.
INORGANIC DIELECTRICS RESEARCH.
Progress rept. no. 5 (Final), 1 Sep 60-1 Nov 61,
by E. J. Smoke, C. J. Phillips, D. R. Ulrich, R. C. Pitetti, and J. R. Smyth. 1 Nov 61, 49p
Contract DA36 039sc85385

Unclassified report

Descriptors: (*Dielectrics, Inorganic compounds), (*Ceramic materials, Dielectrics), Microwave equipment, Glass, Barium compounds, Titanates, Flame spraying, X-ray diffraction analysis, Electrical properties, Dielectric properties, Heat treatment, Lanthanum compounds, Aluminates, Silicates, Boron compounds, Nitrides, Crystal structure, Extrusion, Oxides, Aluminum compounds, Phosphates.

Under Devitrification Studies, barium titanate has been made into a glass by flame spraying into water. Several degrees of purity have been prepared including C. P. grade. DTA exhibits two exothermic peaks between 420 and 730C depending on purity, etc. Several glasses have been made into specimens and devitrified into bodies. The Curie temperature has been increased to 145C, however the dielectric constant is as low as 733 at room temperature and is undoubtedly due to a low specific gravity. Low Loss Microwave Dielectrics is concerned with developing a material exhibiting a dielectric constant between 12 and 15 and a power factor not to exceed 0.0004 at microwave frequencies. Compositions in the La_2O_3-Al_2O_3-SiO_2 system meets these requirements at lower frequencies. High frequency measurements are being made. In Low Loss Boron Nitride Dielectrics the object is to eliminate the deterioration of electrical properties due to hydroscopic properties. The approach is to make bodies containing glass to coat and bond the crystals. A boron phosphate-silica glass at 50 weight percent shows promise. In Transparent Polycrystalline Ceramics the emphasis is on cubic crystalline phases. Initial studies have been with alumina. An atmosphere induction sintering furnace has been constructed and is being evaluated. In Hot Extrusion of Barium Titanate several attempts indicate that this is feasible. An extrusion set-up is ready for use (Author)

16. Medical Sciences

AD-284 068 Div. 16
OTS price HC $1.00/MF $0.50

Oregon State Univ., Corvallis. Agricultural Experiment Station.
RESISTANCE OF MICROORGANISMS TO IONIZING RADIATION APPLIED TO FOOD.
Rept. no. 9 (Final), 2 Jan-60-28 Feb 62

Descriptors: (*Education, USSR), Universities, Training, Physics, Mathematics, Mechanics, Students, Effectiveness.

The present study describes and evaluates the Soviet system of graduate education in the physical-mathematical sciences. As used in this report, the term 'physical-mathematical sciences' includes theoretical physics, experimental physics, theoretical mechanics, applied mathematics, and pure mathematics. An evaluation of the quality of work performed by Soviet graduate students was made possible by locating the titles and authors' names of dissertations listed in the Soviet Book Chronicle, Knizhnaya Letopis, and then comparing this information with the titles and authors of articles published in regularly available scientific literature. Condensed versions of over 500 dissertations found in the open literature have been reviewed, abstracted, and evaluated during this research study. The conclusions stated in this report are based upon the evaluations of the dissertations examined.

25. Physics

AD-410 571 Div. 25, 5, 8
OTS Price HC $5.00/MF $1.00

Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
ABSORPTION OF LASER RADIATION IN THE ATMOSPHERE,
by Ronald K. Long. 31 May 63, 168p OSURF 1579 3
Contract AF33 657 10824, Proj. 5237, Task 523704
Unclassified report

Rept. on Study of Microwave Propagation.

Descriptors: (*Lasers, Resonance absorption), Propagation, Microwaves, Absorption, Atmosphere, Measurement, Solar spectrum, Gases, Water vapor, Optical instruments, Light communication systems, Feasibility studies.

Laser sources have been proposed for communications and radar applications in the atmosphere; therefore a knowledge of the loss parameters of the atmosphere at the laser frequencies is needed for the design of these systems. This work presented a study of one of these loss parameters, molecular resonance absorption, over the 0.6 to 20.0 micron wavelength region. The absorption at more than one hundred laser frequencies was determined. (Author)

AD-411 542 Div. 25, 15, 17
OTS price HC $2.00/MF $0.50

Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
THE THERMAL RESPONSE OF A METAL SLAB TO A CLASS OF RADIALLY DEPENDENT HEAT INPUTS.
by David C. Stickler. 31 Dec 62, 46p OSURF 1107 14
Contract AF30 602 2305, Proj. 5561, Task 556102
RADC TDR63 158
Unclassified report

Descriptors: (*Metals, Heat transfer), (*Lasers, Thermal radiation), Thermal conductivity, Electromagnetic waves, Photons, Elasticity, Thickness, Green's function, Statistical processes, Differential equations.

The temperature fields are deduced for an infinite metal slab of finite thickness produced by a heat flux input which depends on the radial coordinate. The formal solution is obtained by means of transform techniques, and several alternative approaches to their evaluation are presented. Two heat flux inputs are considered in detail. They are the Gaussian input and the uniform input over a circular area of the front surface. Such inputs might be used, for example, as models for a study of the thermal-elastic effects of a laser beam focused on a metal slab. Several asymptotic expansion are presented for the small-time response of the temperature fields under various assumptions on the heat flux input. (Author)

PB-166 050 Div. 25, 10, 27
OTS Price HC $2.00/MF $0.50

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
STUDY OF HEAT TRANSFER TO ROCKET WALLS.
Progress rept.,
by W. A. Hendricks and R. Winer. Dec 48, 32p ABL B3
Contract NOrd9709
ATI 66 969
Unclassified report

Descriptors: (*Rocket motor nozzles, Heat transfer), (*Heat transfer, Rocket motor nozzles), Thermal conductivity, Combustion, Combustion chambers, Temperature, Measurement, Thermocouples, Powders.

A series of tests was made with single perforated H-8 powder grains to determine nozzle outside wall temperatures as functions of burning time, wall thickness and throat diameter. Thermocouples welded to the outside wall of the nozzle were used with high speed recording equipment especially designed for this application. It was found that measurements were reproducible for the outside wall at the nozzle throat, but that considerable variation in temperature from round to round was obtained with thermocouples on the nozzle approach section, presumably due to a carbon deposit built up after initial tests. Methods were also developed for measuring internal wall temperatures and measurements were obtained reproducibly at internal wall thicknesses as small as 0.0144 in. Attempts were made to correlate measured outside wall temperatures with those calculated from a highly simplified theory, but without too much success. (Author)

PB-181 701 Div. 25, 8, 20
OTS Prices: HC $4.00/MF $0.75

A SURVEY OF SOVIET RESEARCH IN PLASMA PHYSICS AND CONTROLLED THERMONUCLEAR FUSION.
Jul 64, 126p
PAL 64 1
Unclassified report

Descriptors: (*Plasma physics, Reviews), (*Thermonuclear reactions, Reviews), Particle trajectories, Plasma medium, Optical properties, Atomic properties, Kinetic theory, Electromagnetic waves, Particle beams, Probes (Electromagnetic), Electric discharges, Magnetic properties, Magnetohydrodynamics, Amplifiers, Oscillators, USSR.

This report reviews and evaluates the plasma physics and controlled fusion research conducted in the USSR during the last few years. The data were derived from the Soviet technical literature, from reports of visits to the Soviet Union by Western physicists, from visits of Soviet physicists to Western countries, and from the proceedings of international scientific conferences on plasma physics related topics. This study is an extension of the survey of Soviet plasma physics made in 1960 at John Hopkins University. The area of coverage of the present report is broader in scope and, in addition, the professional opinions of numerous U. S. plasma physicists have been injected.

27. Propulsion Systems

AD-408 999 Div. 27
OTS Price HC $4.00/MF $0.75

Aerojet-General Corp., Sacramento, Calif.
ABLATIVE THRUST CHAMBER FEASIBILITY.

properties, Lubricants, Failure (Mechanics), Coatings, Castings, Titanium alloys, Molybdenum alloys, Vanadium alloys, Zirconium alloys, Tungsten alloys.

The report covers the goal production of tubing of the alloys D-43 (Cb-10W-1Zr-0.1C) and B-66 (Cb-5Mo-5V-1Zr). Ignot preparation, breakdown extrusion, tube blank extrusion, conditioning, and tube reducing are discussed. Goal size tubing was produced from D-43, but B-66 was not reduced successfully. Final tubing physical properties and chemistry are given. Metallography thru the reduction-anneal schedule is shown. (Author)

PB 166 052 Div. 17, 26
OTS price HC $2.00/MF $0.50

Sylvania Electric Products, Inc., Bayside, N. Y.
THE CLADDING AND WELDING OF STAINLESS STEEL TO MOLYBDENUM AND NIOBIUM.
Rept. of Apr 56-Dec 58
by Joseph Fugardi and John L. Zambrow. Oct 59, 43p
Contract AF33 616 3492, Proj. 7308, Task 73022
WADC TR58 674, AD 231 004

Unclassified report

Descriptors: (*Cladding, Stainless steel), (*Stainless steel, Cladding), (*Composite materials, Sheets), (*Molybdenum, Composite materials), (*Niobium, Composite materials), Nickel, Welding, Bonding, Diffusion, Welds, Rolling (Metallurgy), Manufacturing methods, Stresses, Thermal expansion, Hot working, Microstructure, Laminates, Mechanical properties, Iron.

Methods were investigated for the fabrication of composite sheets consisting of 310 stainless steel bonded to one side of either molybdenum or niobium sheet. A barrier material between the two sheets was used to minimize diffusion. The best barrier material found, on the basis of tensile strength, thermal shock resistance, minimum diffusion during long time high temperature tests and minimum formation of intermetallic compounds at the bonding surfaces, was nickel for the molybdenum to type 310 stainless steel composite and iron for the niobium to type 310 stainless steel composite. Butt welds were made on composite sheets of stainless-molybdenum and stainless-niobium. The difference in the thermal coefficient of expansion between the stainless and the refractory metals used caused stresses and distortion in the weldments. (Author)

19. Navigation

PB-166 066 Div. 19, 7
OTS Price HC $1.00/MF $0.50

Coast Guard, Washington, D. C.
DAYTIME OPERATION OF LIGHTS DURING FOG.
Civil Engineering rept. no. 11
16 Nov 54, 17p
CG 250 11

Unclassified report

Descriptors: (*Lighthouses, Lighting equipment), (*Navigational lights, Fog), (*Lighting equipment, Navigational lights), Beacon lights, Visibility, Haze, Optical properties, Operation, Standardization.

The purpose of this report is twofold: (a) To make known and to emphasize the advantage of operating certain major lights during daytime periods of reduced visibility; and (b) to establish criteria for determining when to turn on such lights. Conclusions: (a) At lighthouses where collision dangers exist, it is advantageous to turn on the main light when the fog signal is put into operation; (b) at lighthouses where no collision dangers exist, it appears advantageous to turn on the main light when the signal is put into operation only if the intensity of the light is 50,000 candlepower or greater. (Author)

20. Nuclear Physics and Nuclear Chemistry

AD-274 686 Div. 20, 14
OTS price HC $2.00/MF $0.50

Rock Island Arsenal Lab., Ill.
CASTABLE MATERIALS FOR NEUTRON SHIELDS (PART 2).
Technical rept.
by W. M. Veroeven and J. W. McGarvey. 20 Feb 62, 34p
Proj. 548 03 003
RIAL 62 654

Unclassified report

Descriptors: (*Neutrons, Shielding), (*Shielding, Neutrons), (*Elastomers, Shielding), Rubber, Butyl rubber, Polymers, Butadiene, Ethylenes, Boron, Aging (Materials), Vulcanization, Casting, Health physics.

This report is concerned with the development of elastomeric materials for neutron shields. Numerous liquid natural, butyl and polybutadiene rubber, together with a specially synthesized boron modified, acrylic acid terpolymer were evaluated to determine their curing characteristics and properties pertaining to neutron shields. It was determined that a polybutene extended butyl rubber filled with polyethylene and vulcanized using a quinoid type cure offers the most promise as a room temperature pumpable and curable, high hydrogen density neutron shield matrix. (Author)

AD-440 307 Div. 20, 17
OTS Price HC $5.00/MF $1.00

Nuclear Metals, Inc., Concord, Mass.
DIFFUSION IN REFRACTORY METALS.
by E. J. Rapperport, Victor Nerses, and M. F. Smith.
Mar 64, 188p NMI 9422
Contract AF33 616 7382, Proj. 7351, Task 735101
ML TDR64 61

Unclassified report

Descriptors: (*Refractory metals, Diffusion), (*Heat-resistant metals and alloys, Phase studies), Alloys, Tungsten, Ruthenium, Iridium, Rhodium, Platinum, Niobium, Chromium, Molybdenum, Silicon, High temperature research, Tables, Chemical analysis, Melting, Bonding, Heat treatment, Spectrographic analysis, Computers.

Interdiffusion coefficients for the systems W-Ru, W-Ir, W-Rh, W-Pt, Cb-Cr and Mo-MoSi2 have been calculated in the temperature range from 900C to 2100C. Tables of interdiffusion coefficients for constituent compositions ranging from 99 atomic percent to 1 atomic percent are presented. (Author)

23. Personnel and Training

PB 181 702 Div. 23, 15, 25
OTS Prices: HC $3.00/MF $0.50

SOVIET GRADUATE TRAINING IN THE PHYSICAL-MATHEMATICAL SCIENCES.
Jul 64, 54p
PAL 64 2

Unclassified report

Metallurgy, Refractory metals, Niobium, Zone melting, Bismuth, Stainless steel, Steel, Cathodic protection, Corrosion, Nuclear physics, Nuclear cross sections, Optics, Lasers, Radio, Radio transmitters, Data processing systems, Masers, Solid state physics, Crystal lattices, Patents.

Contents:
Articles:
The Control of Liquid Spreading, by C. R. Singleterry
Optical Atomic Spectroscopy with a Van de Graff Accelerator by S. Bashkin, A. B. Meinel, P. R. Malmberg, and S. G. Tilford
Scientific Program:
Chemistry: Chemonuclear synthesis of nitrogen-fluorine compounds. Solubilization of polar species by micelle-forming soaps in a nonpolar solvent. Conductance of alkali-metal sulfonates in polar organic solvents. Physical and chemical parameters affecting the damping of capillary water waves by monomolecular layers of organic materials. Ignition and combustion properties of activated carbon containing adsorbed hydrocarbons.
Mathematics: A floating-point interpretive programming system for NRL's NAREC computer
Mechanics: Miniaturized shock spectrum computer
Metallurgy and Ceramics: Defect structures in refractory metals. The effect of interstitial contaminants on creep-rupture properties of niobium. Experience with a high-vacuum electron-beam floating-zone melter. Morphology of rapid crystal growth in supercooled bismuth. Effects of cyclic irradiation-annealing treatment on pressure vessel steels. An investigation of pitting phenomena in some stainless steels using the potentiodynamic technique. Cathodic protection of wire rope. Stress corrosion cracking of a high strength steel
Nuclear and Atomic Physics: Nuclear cross-section investigation
Optics: Attenuation of laser light through water. Coolable flashlamps for laser operation
Radio: Frequency of errors in modem systems. Display equipment for frequency separation between channels on a transmitter multicoupler. Automatic digital data recording system for recording amplitude and phase of receiver signals. A technique for controlling standard frequencies with a hydrogen maser
Solid State: Spurious signals from thermoluminescent dosimeters. Anisotropic lattice absorption by needle-shaped crystals

31. Ships and Marine Equipment

PB-166 071 Div. 31, 5, 19, 27
OTS Prices: HC $5.00/MF $1.00

Norden Div., United Aircraft Corp., Norwalk, Conn.
MERCHANT SHIP AUTOMATION STUDY. SUMMARY AND RECOMMENDATIONS.
Final rept.,
by Curtis T. Clayton and Leo Botwin. 20 Jun 61, 152p
Norden 262R0011
Contract MA2228

Unclassified report

Descriptors: (*Merchant vessels, Automation), (*Automation, Merchant vessels), Marine engineering, Control systems, Navigation, Communication systems, Marine surface propulsion, Economics, Law, Employee relations, Systems engineering.

Contents:
Automatic ship control and communications system, Automatic control of engineering functions, Powerplants and auxiliaries, Economic aspects of automation, Legal aspects of automation, and Impact of merchant ship automation on maritime labor relations.

PB-166 072 Div. 31, 5, 6, 19
OTS Prices: HC $6.00/MF $1.25

Norden Div., United Aircraft Corp., Norwalk, Conn.
MERCHANT SHIP AUTOMATION STUDY. AUTOMATIC SHIP CONTROL AND COMMUNICATIONS SYSTEMS.
Final rept.,
by Curtis T. Clayton and Leo Botwin. 5 Apr 61, 206p
Norden 262R0012
Contract MA2228

Unclassified report

Descriptors: (*Merchant vessels, Automation), (*Automation, Merchant vessels), (*Control systems, Merchant vessels), (*Communications systems, Merchant vessels), (*Navigation, Merchant vessels), Systems engineering, Position finding, Navigation computers, Radar navigation, Radio communication systems, Intercommunication systems, Tracking, Damage control, Stability, Buoyancy, Data processing systems, Computers.

Contents: Navigation, steering system, radar collision avoidance system, digital computations for navigation, communications, damage indication and control, and trim, list, and stability control.

PB-166 073 Div. 31, 6, 19
OTS Prices: HC $6.00/MF $1.25

Norden Div., United Aircraft Corp., Norwalk, Conn.
MERCHANT SHIP AUTOMATION STUDY. APPENDICE TO AUTOMATIC SHIP CONTROL AND COMMUNICATIONS SYSTEMS.
Final rept.,
by Curtis T. Clayton and Leo Botwin. 5 Apr 61, 210p
Norden 262R0013, Norden 262R0012, app.
Contract MA2228

Unclassified report

Descriptors: (*Merchant vessels, Automation), (*Automation, Merchant vessels), (*Navigation, Merchant vessels), Radar navigation, Navigation computers, Errors, Programming (Computers), Position finding, Navigation satellites, Loran, Navigational aid, Inertial navigation, Tracking, Detection, Systems engineering.

Contents: Anti clutter techniques for collision avoidance, great circle computer, programming for collision avoidance, expected dead reckoning instrumentation accuracies, probable navigation errors caused by ocean currents, detailed description of position plotter, hybrid radar collision avoidance system, analogue method of obtaining position fixes from transit satellites, loran, automatic correction of dead reckoning information, auxiliary navigation aids, and inertial navigation system for an automatic ship.

PB-166 074 Div. 31, 27
OTS Prices: HC $7.00/MF $1.75

Norden Div., United Aircraft Corp., Norwalk, Conn.
MERCHANT SHIP AUTOMATION STUDY. AUTOMATIC CONTROL OF ENGINEERING FUNCTIONS.
Final rept.,
by Curtis T. Clayton and Leo Botwin. 5 Apr 61, 346p
Norden 262R0014
Contract MA2228

Unclassified report

Descriptors: (*Merchant vessels, Automation), (*Automation, Merchant vessels), (*Control systems, Merchant vessels), Marine engineering, Marine surface propulsion, Economics, Auxiliary power plants, Data processing systems, Computers, Operation, Steam power plants, Gas turbines, Ship turbines, Safety, Systems engineering.

A description is given of the main propulsion units (or powerplants) considered for economic evaluation and a description of the general approach adopted in performing the

Final rept., Vol. 1
28 Jun 63, 113p AGC 652 SA4 2 2F1V1
Contract AF04 647 652SA4

Unclassified report

Descriptors: (*Combustion chambers, Ablation), (*Rocket motors (Liquid propellant), Combustion chambers), Thrust, Design, Production, Molding, Space propulsion, Materials, Heat transfer, Cooling, Photographs, Feasibility studies, Tests, Nitrogen compounds, Tetroxides, Pressure, Fuel injectors.

The design, fabrication, and assembly of six large-scale ablative thrust chambers, utilizing the compression-molded, building block concept is described in this volume. The chambers were designed for evaluation and demonstration of the feasibility for in-space use, at chamber pressures of 40 to 300 psia and thrust equivalents of 5,100 to 38,000 lb for durations up to 20 min. Materials were evaluated in 36 subscale engine tests. (Author)

30. Research and Research Equipment

AD-430 892 Div. 30
OTS Price HC $4.00/MF $0.75

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
MIDAS PROGRAMMING GUIDE,
by R. T. Harnett, F. J. Sansom, and L. M. Warshawsky.
Jan 64, 109p
Proj. 1523, Task 152304
SEG TDR64 1

Unclassified report

Descriptors: (*Differential equations, Programming (Computers)), (*Programming (Computers), Handbooks), (*Digital computers, Programming (Computers)), (*Analog computers, Programming (Computers)), Simulators, Integrators, Nonlinear differential equations, Integration, Functions, Combinatorial analysis.

This report is intended to serve as a working manual for the MIDAS (Modified Integration Digital Analog Simulator) computer program that provides digital solutions on an IBM 7090 (7094) computer for systems of ordinaty differential equations. The program is primarily intended to be used for obtaining check solutions for analog computer simulations and this report is written from the viewpoint of an analog programmer. Since it features the use of floating point arithmetic and a variable step size integration routine, amplitude and time scaling are not required for the MIDAS solution. The check solution obtained via MIDAS can be used to provide this all-important information for the analog program. (Author)

AD-439 838 Div. 30
OTS price HC $4.00/MF $1.00

Electro-Optical Systems, Inc., Pasadena, Calif.
STUDY, DESIGN, AND FABRICATION OF SOLAR ENERGY CONCENTRATOR MODELS.
Final rept., 1 Jun 61-31 Apr 63,
by L. M. Springer. Apr 64, 128p EOS 1860
Contract AF33 616 8402, Proj. 3145, Task 314502
RTD TDR63 4051

Unclassified report

Descriptors: (*Solar radiation, Energy conversion), (*Reflectors, Monocoques), Mechanics, Machines, Parabolic bodies, Anodes, Electroforming, Design, Standards, Models (Simulations), Epoxy plastics, Polyester plastics, Isocyanate plastics, Energy, Correlation techniques, Structural properties, Polishes, Storage.

Six nonreflective, all-metal monocoque segment electroformed petals of a 44 1/2-foot-diameter parabolic reflector were designed, fabricated, and tested. The interrelationships between weight, accuracy, and some structural characteristics were relatively inexpensively investigated. Fabrication techniques and process parameters were identified and evaluated for future use. Replication accuracy was related to concentrator system performance by means of a solar ray-tracing technique. Simple structural comparisons were made by means of bending and torsional spring rate determinations. Petal fabrication and test gear, including all of the required patterns and attendant electroforming equipment were designed and fabricated. Recommendations for certain features of more sophisticated future programs involving large light-weight electroformed structures were derived. (Author)

PB-166 041 Div. 30, 16
OTS price HC $4.00/MF $1.00

General Electric Co., Washington, D. C.
MEDLARS PRELIMINARY DESIGN.
Final technical rept., Phase I
31 Jan 62, 149p
Contract PH86 62 8

Unclassified report

Descriptors: (*Data processing systems, Computers), (*Information retrieval, Medical research), Input-output devices, Data storage systems, Computer personnel, Typewriters, Design, Libraries, Human engineering, Bibliographies.

The technical report describes the Medical Literature Analysis and Retrieval System (MEDLARS) Preliminary Design effort. The report includes a description of the recommended system, the alternate configurations considered, and the steps taken to arrive at the recommended system. Both the present mechanized system and MEDLARS are briefly described; the additional benefits MEDLARS will provide to the Library are itemized; and the relationship of the Preliminary Design Phase to the entire program is shown. (Author)

PB-166 042 Div. 30, 12
OTS price HC $1.00/MF $0.50

Army Missile Command Computation Center, Army Missile Support Command, Redstone Arsenal, Ala.
A MODULAR GENERAL PURPOSE PROGRAM FOR TIME SERIES DATA REDUCTION FOR POST REAL TIME REDUCTION OF CONSTANT TIME INTERVAL DATA.
Internal technical note no. 41
by Roger A. MacGowan. 2 May 63, 20p

Unclassified report

Descriptors: (*Series, Time), (*Programming (Computers), Series)), (*Real time, Data), Reduction, Time-interval counters, Programming languages, Compilers, Algebra, Ballistics, Modules (Electronic).

Included in the report is Fortran Subroutines for Time Series Data Reduction. Communications of the ACM, v. 7, no. 3, p. 153-157

PB-181 564 Div. 30
OTS Prices: HC $1.25/MF $0.50

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS
Jul 64

Unclassified report

Descriptors: (*Scientific research), (*Naval research), Atomic spectroscopy, Chemistry, Nitrogen compounds, Fluorine compounds, Soaps, Electrochemistry, Organic materials, Hydrocarbons, Combustion, Mathematics, Programming (Computers), Mechanics, Computers,

32. Miscellaneous Arts and Sciences

PB-181 712 Div. 32
OTS Prices: HC $8.00/MF $2.00

Datatrol Corp., Silver Spring, Md.
INDEXING TERMS OF ANNOUNCEMENT PUBLICATIONS FOR GOVERNMENT SCIENTIFIC AND TECHNICAL RESEARCH REPORTS. A COMPOSITE VOCABULARY. VOLUME I, ALPHABETIC LISTING.
Technical rept. no. IR 15 vol. 1,
by William Hammond and Staffan Rosenborg. Apr 64, 453p
Grant NSF C295

Unclassified report

Descriptors: (*Vocabulary, Subject indexing), (*Subject indexing, Vocabulary), Indexes, Documentation, Reports, Scientific research, Classification.

The listing of terms in this volume and of Volume II (PB-181 713) which displays the same terms structured to a common subsumption scheme, is essentially a composite of the subject indexing vocabularies used by the Atomic Energy Commission (AEC), the Defense Documentation Center (DDC), the National Aeronautics and Space Administration (NASA), and the Office of Technical Services (OTS) to index their research report announcement publications. (Author)

PB-181 713 Div. 32
OTS Prices: HC $8.00/MF $2.00

Datatrol Corp., Silver Spring, Md.
INDEXING TERMS OF ANNOUNCEMENT PUBLICATIONS FOR GOVERNMENT SCIENTIFIC AND TECHNICAL RESEARCH REPORTS. A COMPOSITE VOCABULARY. VOLUME II, STRUCTURED LISTING.
Technical rept. no. IR 15, vol. 2,
by William Hammond and Staffen Rosenborg. Apr 64, 468p
Grant NSF C295

Unclassified report

Descriptors: (*Vocabulary, Subject indexing), (*Subject indexing, Vocabulary), Indexes, Documentation, Reports, Scientific research.

This volume contains the composite vocabulary of Volume I (PB-181 712), structured to the subsumption scheme discussed in that volume. The publication represents the initial attempt to structure the terms to a common scheme. The structuring is intended to reflect how the terms have actually been used. (Author)

33. Transportation

PB-166 049 Div. 33
OTS Price HC $4.00/MF $1.00

Operations Research, Inc., Silver Spring, Md.
COMPARATIVE ANALYSIS OF RAPID TRANSIT VEHICLE SYSTEMS.
Preliminary study,
by H. O. Davidson, J. L. Crain, and E. W. Davis.
Jul 62, 129p

Unclassified report

Prepared for the National Capital Transportation Agency.

Descriptors: (*Transportation, District of Columbia), (*Passenger vehicles, Feasibility studies), Costs, Engineering, Control systems, Automation, Propulsion, Distribution, Safety, Effectiveness, Analysis, Urban areas.

The primary objective of this analysis has been to provide a realistic set of alternatives (of rapid transit vehicle systems) on which judgment may be made as to what, if any, technological advances in rapid transit vehicle systems are feasible and worth exploring. For those systems that appear feasible and worthwhile it is required that the contractor define what additional technical analyses are required to support a final choice among the various alternatives, what program can be established for accomplishing this work, and what resources are required to implement this program. A secondary objective of the study has been a preliminary review of vehicle and traffic control systems with particular emphasis on central control devices and automated train operation. The interrelations between control systems, vehicle type, and alternative operational concepts are such that analysis of rapid transit vehicle systems would be incomplete without some preliminary assessment of control system alternatives. (Author)

study of the feasibility of automating the engineering functions for the various main propulsion units and auxiliary systems. These sections are followed by detailed descriptions of the technical and economic analyses for each case studied. The data presented include the identification of control and equipment problems, a description of the method and degree of automation selected, reliability and maintenance considerations, effects on system performance, the role and size of the crew, and the cost of the automatic control equipment for each of the engineering functions associated with the particular main propulsion unit and ship generation studied. For each case, the decision as to the best economic balance between manual and automated operations is presented. (Author)

PB-166 075 Div. 31, 27
OTS Prices: HC $6.00/MF $1.25

Norden Div., United Aircraft Corp., Norwalk, Conn.
MERCHANT SHIP AUTOMATION STUDY. APPENDICES TO AUTOMATIC CONTROL OF ENGINEERING FUNCTIONS.
Final rept.,
by Curtis T. Clayton and Leo Botwin. 5 Apr 61, 202p
Norden 262R0015, Norden 262R0014, append.
Contract MA2228

Unclassified report

Descriptors: (*Merchant vessels, Automation), (*Automation, Merchant vessels), (*Control systems, Merchant vessels), Performance (Engineering), Maintenance, Personnel management, Documentation, Costs, Systems engineering, Failure (Mechanics).

Contents:
Definition of Drawing Symbols, Glossary of Automatic Control Terms, Failure Analyses, Crew Task Analysis, Maintenance Analysis, Equipment Lists, and Supporting Economic Data.

PB-166 076 Div. 31, 27
OTS Prices: HC $3.00/MF $0.50

Norden Div., United Aircraft Corp., Norwalk, Conn.
MERCHANT SHIP AUTOMATION STUDY. POWERPLANTS AND AUXILIARIES FOR AUTOMATED SHIPS.
Final rept.,
by Curtis T. Clayton and Leo Botwin. 5 Apr 61, 52p
Norden 262R0016
Contract MA2228

Unclassified report

Descriptors: (*Merchant vessels, Automation), (*Automation, Merchant vessels), (*Marine propulsion, Merchant vessels), Marine engines, Steam power plants, Gas turbines, Diesel engines, Auxiliary power plants, Specifications, Economics, Costs, Weight, Fuel consumption, Systems engineering.

The type of powerplant and its associated auxiliaries has a significant effect on the cost of automation. This study is concerned with the technical and economic analysis of the available powerplant types for marine application. The problem of automating a merchant ship was studied through the automation of a 'C-4 Mariner' dry cargo ship. The present steam powerplant rated at 17,500 normal horsepower was used as a reference throughout this study. A summary is given for the various 17,500 horsepower powerplants installed in the 'C-4 Mariner' merchant ship. The machinery costs reflect an unautomated system. Hamilton Standard Division has compiled the automation costs of the various powerplant types. In addition to the present steam plant, a lightweight gas turbine, an industrial gas turbine, a direct-drive Diesel, and a high pressure steam plant were studied. (Author)

PB-166 077 Div. 31, 32
OTS Prices: HC $3.00/MF $0.75

Norden Div., United Aircraft Corp., Norwalk, Conn.
MERCHANT SHIP AUTOMATION STUDY. ECONOMIC ASPECTS OF AUTOMATION.
Final rept.,
by Curtis T. Clayton and Leo Botwin. 5 Apr 61, 98p
Norden 262R0017
Contract MA2228

Unclassified report

Descriptors: (*Merchant vessels, Automation), (*Automation, Merchant vessels), (*Economics, Merchant vessels), Operation, Costs, Wages, Marine surface propulsion, Fuels, Transportation, Maintenance, Systems engineering.

This volume is comprised of two Parts, Part A and Part B. Part A compares the potential commercial benefit of various proposed shipboard automation applications, it also calls the attention to the more profitable areas of further research and development. Part B describes the aspects of subsidy and incentive. Studies show that shipboard automation can help close the gap between U. S. and foreign maritime operating costs. However, the introduction of automation poses certain problems for government, for shipowners, and for labor. In the overall view, the potential benefits of automation make it almost imperative that these problems be met and solved. Unfortunately, the present subsidy system under which much of our merchant marine operates, fails to provide either shipowner or seaman with any incentive to adopt automation. Under the present law, the benefits of automation would almost entirely accrue to the government. (Author)

PB-166 078 Div. 31, 32, 33
OTS Prices: HC $3.00/MF $0.75

Norden Div., United Aircraft Corp., Norwalk, Conn.
MERCHANT SHIP AUTOMATION STUDY. LEGAL IMPLICATIONS OF AUTOMATION.
Final rept.,
by Curtis T. Clayton and Leo Botwin. 5 Apr 61, 76p
Norden 262R0018
Contract MA2228

Unclassified report

Descriptors: (*Merchant vessels, Automation), (*Automation, Merchant vessels), (*Law, Shipping (Marine)), Water traffic, Operation, Personnel management, Navigation, Systems engineering.

An automated ship, whether partically or fully automated must contain the capability of conforming to the applicable international regulations prescribed for the navigation of vessels on the high seas. This capability must include a sophistication sufficient to enable the ship to respond as a conventional vessel would have done in special circumstances not explicitly covered by the Rules to Prevent Collisions at Sea and also to enable the ship to react in accordance with the rules of good seamanship. In the case of the partially automated ships, no very substantial changes in statute or regulation are likely to be necessitated. However, if total automation becomes an imminent technical concept, substantial changes in a great variety of statutes, regulations, and treaties are inevitable. Manning, crew and officer competence, watches, collision rules, various duties of the master, mates and crews, entry, clearance, and other areas will be greatly altered by the absence of a master, officer officers, and crew. (Author)

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